ELECTROCHEMICAL SERIES

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There are three tables for this electrochemical series. Each table lists standard reduction potentials, $E°$ values, at 298.15 K (25°C), and at a pressure of 101.325 kPa (1 atm). Table 1 is an alphabetical listing of the elements, according to the symbol of the elements. Thus, data for silver (Ag) precedes those for aluminum (Al). Table 2 lists only those reduction reactions which have $E°$ values positive in respect to the standard hydrogen electrode. In Table 2, the reactions are listed in the order of increasing positive potential, and they range from 0.0000 V to + 3.4 V. Table 3 lists only those reduction potentials which have $E°$ negative with respect to the standard hydrogen electrode. In Table 3, the reactions are listed in the order of decreasing potential and range from 0.0000 V to –4.10 V. The reliability of the potentials is not the same for all the data. Typically, the values with fewer significant figures have lower reliability. The values of reduction potentials, in particular those of less common reactions, are not definite; they are subject to occasional revisions.

Abbreviations: ac = acetate; bipy = 2,2′-dipyridine, or bipyridine; en = ethylenediamine; phen = 1,10-phenanthroline.

REFERENCES

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2. A. J. Bard, R. Parsons, and J. Jordan, *Standard Potentials in Aqueous Solutions*, Marcel Dekker, New York, 1985.
3. S. G. Bratsch, *J. Phys. Chem. Ref. Data*, 18, 1—21, 1989.

TABLE 1
Alphabetical Listing

Reaction	$E°$/V	Reaction	$E°$/V
$Ac^{3+} + 3\ e \rightleftharpoons Ac$	–2.20	$Al(OH)_4^- + 3\ e \rightleftharpoons Al + 4\ OH^-$	–2.328
$Ag^+ + e \rightleftharpoons Ag$	0.7996	$H_2AlO_3^- + H_2O + 3\ e \rightleftharpoons Al + 4\ OH^-$	–2.33
$Ag^{2+} + e \rightleftharpoons Ag^+$	1.980	$AlF_6^{3-} + 3\ e \rightleftharpoons Al + 6\ F^-$	–2.069
$Ag(ac) + e \rightleftharpoons Ag + (ac)^-$	0.643	$Am^{4+} + e \rightleftharpoons Am^{3+}$	2.60
$AgBr + e \rightleftharpoons Ag + Br^-$	0.07133	$Am^{2+} + 2\ e \rightleftharpoons Am$	–1.9
$AgBrO_3 + e \rightleftharpoons Ag + BrO_3^-$	0.546	$Am^{3+} + 3\ e \rightleftharpoons Am$	–2.048
$Ag_2C_2O_4 + 2\ e \rightleftharpoons 2\ Ag + C_2O_4^{2-}$	0.4647	$Am^{3+} + e \rightleftharpoons Am^{2+}$	–2.3
$AgCl + e \rightleftharpoons Ag + Cl^-$	0.22233	$As + 3\ H^+ + 3\ e \rightleftharpoons AsH_3$	–0.608
$AgCN + e \rightleftharpoons Ag + CN^-$	–0.017	$As_2O_3 + 6\ H^+ + 6\ e \rightleftharpoons 2\ As + 3\ H_2O$	0.234
$Ag_2CO_3 + 2\ e \rightleftharpoons 2\ Ag + CO_3^{2-}$	0.47	$HAsO_2 + 3\ H^+ + 3\ e \rightleftharpoons As + 2\ H_2O$	0.248
$Ag_2CrO_4 + 2\ e \rightleftharpoons 2\ Ag + CrO_4^{2-}$	0.4470	$AsO_2^- + 2\ H_2O + 3\ e \rightleftharpoons As + 4\ OH^-$	–0.68
$AgF + e \rightleftharpoons Ag + F^-$	0.779	$H_3AsO_4 + 2\ H^+ + 2\ e^- \rightleftharpoons HAsO_2 + 2\ H_2O$	0.560
$Ag_4[Fe(CN)_6] + 4\ e \rightleftharpoons 4\ Ag + [Fe(CN)_6]^{4-}$	0.1478	$AsO_4^{3-} + 2\ H_2O + 2\ e \rightleftharpoons AsO_2^- + 4\ OH^-$	–0.71
$AgI + e \rightleftharpoons Ag + I^-$	–0.15224	$At_2 + 2\ e \rightleftharpoons 2\ At^-$	0.3
$AgIO_3 + e \rightleftharpoons Ag + IO_3^-$	0.354	$Au^+ + e \rightleftharpoons Au$	1.692
$Ag_2MoO_4 + 2\ e \rightleftharpoons 2\ Ag + MoO_4^{2-}$	0.4573	$Au^{3+} + 2\ e \rightleftharpoons Au^+$	1.401
$AgNO_2 + e \rightleftharpoons Ag + 2\ NO_2^-$	0.564	$Au^{3+} + 3\ e \rightleftharpoons Au$	1.498
$Ag_2O + H_2O + 2\ e \rightleftharpoons 2\ Ag + 2\ OH^-$	0.342	$Au^{2+} + e^- \rightleftharpoons Au^+$	1.8
$Ag_2O_3 + H_2O + 2\ e \rightleftharpoons 2\ AgO + 2\ OH^-$	0.739	$AuOH^{2+} + H^+ + 2\ e \rightleftharpoons Au^+ + H_2O$	1.32
$Ag^{3+} + 2\ e \rightleftharpoons Ag^+$	1.9	$AuBr_2^- + e \rightleftharpoons Au + 2\ Br^-$	0.959
$Ag^{3+} + e \rightleftharpoons Ag^{2+}$	1.8	$AuBr_4^- + 3\ e \rightleftharpoons Au + 4\ Br^-$	0.854
$Ag_2O_2 + 4\ H^+ + e \rightleftharpoons 2\ Ag + 2\ H_2O$	1.802	$AuCl_4^- + 3\ e \rightleftharpoons Au + 4\ Cl^-$	1.002
$2\ AgO + H_2O + 2\ e \rightleftharpoons Ag_2O + 2\ OH^-$	0.607	$Au(OH)_3 + 3\ H^+ + 3\ e \rightleftharpoons Au + 3\ H_2O$	1.45
$AgOCN + e \rightleftharpoons Ag + OCN^-$	0.41	$H_2BO_3^- + 5\ H_2O + 8\ e \rightleftharpoons BH_4^- + 8\ OH^-$	–1.24
$Ag_2S + 2\ e \rightleftharpoons 2\ Ag + S^{2-}$	–0.691	$H_2BO_3^- + H_2O + 3\ e \rightleftharpoons B + 4\ OH^-$	–1.79
$Ag_2S + 2\ H^+ + 2\ e \rightleftharpoons 2\ Ag + H_2S$	–0.0366	$H_3BO_3 + 3\ H^+ + 3\ e \rightleftharpoons B + 3\ H_2O$	–0.8698
$AgSCN + e \rightleftharpoons Ag + SCN^-$	0.08951	$B(OH)_3 + 7\ H^+ + 8\ e \rightleftharpoons BH_4^- + 3\ H_2O$	–0.481
$Ag_2SeO_3 + 2\ e \rightleftharpoons 2\ Ag + SeO_4^{2-}$	0.3629	$Ba^{2+} + 2\ e \rightleftharpoons Ba$	–2.912
$Ag_2SO_4 + 2\ e \rightleftharpoons 2\ Ag + SO_4^{2-}$	0.654	$Ba^{2+} + 2\ e \rightleftharpoons Ba(Hg)$	–1.570
$Ag_2WO_4 + 2\ e \rightleftharpoons 2\ Ag + WO_4^{2-}$	0.4660	$Ba(OH)_2 + 2\ e \rightleftharpoons Ba + 2\ OH^-$	–2.99
$Al^{3+} + 3\ e \rightleftharpoons Al$	–1.662	$Be^{2+} + 2\ e \rightleftharpoons Be$	–1.847
$Al(OH)_3 + 3\ e \rightleftharpoons Al + 3\ OH^-$	–2.31	$Be_2O_3^{2-} + 3\ H_2O + 4\ e \rightleftharpoons 2\ Be + 6\ OH^-$	–2.63

DropBooks

TABLE 1
Alphabetical Listing (continued)

Reaction	$E°$/V
p–benzoquinone + 2 H^+ + 2 e $\rightleftharpoons$ hydroquinone	0.6992
Bi^+ + e $\rightleftharpoons$ Bi	0.5
Bi^{3+} + 3 e $\rightleftharpoons$ Bi	0.308
Bi^{3+} + 2 e $\rightleftharpoons$ Bi^+	0.2
Bi + 3 H^+ + 3 e $\rightleftharpoons$ BiH_3	–0.8
$BiCl_4^-$ + 3 e $\rightleftharpoons$ Bi + 4 Cl^-	0.16
Bi_2O_3 + 3 H_2O + 6 e $\rightleftharpoons$ 2 Bi + 6 OH^-	–0.46
Bi_2O_4 + 4 H^+ + 2 e $\rightleftharpoons$ 2 BiO^+ + 2 H_2O	1.593
BiO^+ + 2 H^+ + 3 e $\rightleftharpoons$ Bi + H_2O	0.320
BiOCl + 2 H^+ + 3 e $\rightleftharpoons$ Bi + Cl^- + H_2O	0.1583
Bk^{4+} + e $\rightleftharpoons$ Bk^{3+}	1.67
Bk^{2+} + 2 e $\rightleftharpoons$ Bk	–1.6
Bk^{3+} + e $\rightleftharpoons$ Bk^{2+}	–2.8
Br_2(aq) + 2 e $\rightleftharpoons$ 2 Br^-	1.0873
Br_2(l) + 2 e $\rightleftharpoons$ 2 Br^-	1.066
HBrO + H^+ + 2 e $\rightleftharpoons$ Br^- + H_2O	1.331
HBrO + H^+ + e $\rightleftharpoons$ 1/2 Br_2(aq) + H_2O	1.574
HBrO + H^+ + e $\rightleftharpoons$ 1/2 Br_2(l) + H_2O	1.596
BrO^- + H_2O + 2 e $\rightleftharpoons$ Br^- + 2 OH^-	0.761
BrO_3^- + 6 H^+ + 5 e $\rightleftharpoons$ 1/2 Br_2 + 3 H_2O	1.482
BrO_3^- + 6 H^+ + 6 e $\rightleftharpoons$ Br^- + 3 H_2O	1.423
BrO_3^- + 3 H_2O + 6 e $\rightleftharpoons$ Br^- + 6 OH^-	0.61
$(CN)_2$ + 2 H^+ + 2 e $\rightleftharpoons$ 2 HCN	0.373
2 HCNO + 2 H^+ + 2 e $\rightleftharpoons$ $(CN)_2$ + 2 H_2O	0.330
$(CNS)_2$ + 2 e $\rightleftharpoons$ 2 CNS^-	0.77
CO_2 + 2 H^+ + 2 e $\rightleftharpoons$ HCOOH	–0.199
Ca^+ + e $\rightleftharpoons$ Ca	–3.80
Ca^{2+} + 2 e $\rightleftharpoons$ Ca	–2.868
$Ca(OH)_2$ + 2 e $\rightleftharpoons$ Ca + 2 OH^-	–3.02
Calomel electrode, 1 molal KCl	0.2800
Calomel electrode, 1 molar KCl (NCE)	0.2801
Calomel electrode, 0.1 molar KCl	0.3337
Calomel electrode, saturated KCl (SCE)	0.2412
Calomel electrode, saturated NaCl (SSCE)	0.2360
Cd^{2+} + 2 e $\rightleftharpoons$ Cd	–0.4030
Cd^{2+} + 2 e $\rightleftharpoons$ Cd(Hg)	–0.3521
$Cd(OH)_2$ + 2 e $\rightleftharpoons$ Cd(Hg) + 2 OH^-	–0.809
$CdSO_4$ + 2 e $\rightleftharpoons$ Cd + SO_4^{2-}	–0.246
$Cd(OH)_4^{2-}$ + 2 e $\rightleftharpoons$ Cd + 4 OH^-	–0.658
CdO + H_2O + 2 e $\rightleftharpoons$ Cd + 2 OH^-	–0.783
Ce^{3+} + 3 e $\rightleftharpoons$ Ce	–2.336
Ce^{3+} + 3 e $\rightleftharpoons$ Ce(Hg)	–1.4373
Ce^{4+} + e $\rightleftharpoons$ Ce^{3+}	1.72
$CeOH^{3+}$ + H^+ + e $\rightleftharpoons$ Ce^{3+} + H_2O	1.715
Cf^{4+} + e $\rightleftharpoons$ Cf^{3+}	3.3
Cf^{3+} + e $\rightleftharpoons$ Cf^{2+}	–1.6
Cf^{3+} + 3 e $\rightleftharpoons$ Cf	–1.94
Cf^{2+} + 2 e $\rightleftharpoons$ Cf	–2.12
Cl_2(g) + 2 e $\rightleftharpoons$ 2 Cl^-	1.35827
HClO + H^+ + e $\rightleftharpoons$ 1/2 Cl_2 + H_2O	1.611
HClO + H^+ + 2 e $\rightleftharpoons$ Cl^- + H_2O	1.482
ClO^- + H_2O + 2 e $\rightleftharpoons$ Cl^- + 2 OH^-	0.81
ClO_2 + H^+ + e $\rightleftharpoons$ $HClO_2$	1.277
$HClO_2$ + 2 H^+ + 2 e $\rightleftharpoons$ HClO + H_2O	1.645
$HClO_2$ + 3 H^+ + 3 e $\rightleftharpoons$ 1/2 Cl_2 + 2 H_2O	1.628
$HClO_2$ + 3 H^+ + 4 e $\rightleftharpoons$ Cl^- + 2 H_2O	1.570
ClO_2^- + H_2O + 2 e $\rightleftharpoons$ ClO^- + 2 OH^-	0.66
ClO_2^- + 2 H_2O + 4 e $\rightleftharpoons$ Cl^- + 4 OH^-	0.76
ClO_2(aq) + e $\rightleftharpoons$ ClO_2^-	0.954
ClO_3^- + 2 H^+ + e $\rightleftharpoons$ ClO_2 + H_2O	1.152
ClO_3^- + 3 H^+ + 2 e $\rightleftharpoons$ $HClO_2$ + H_2O	1.214
ClO_3^- + 6 H^+ + 5 e $\rightleftharpoons$ 1/2 Cl_2 + 3 H_2O	1.47
ClO_3^- + 6 H^+ + 6 e $\rightleftharpoons$ Cl^- + 3 H_2O	1.451
ClO_3^- + H_2O + 2 e $\rightleftharpoons$ ClO_2^- + 2 OH^-	0.33
ClO_3^- + 3 H_2O + 6 e $\rightleftharpoons$ Cl^- + 6 OH^-	0.62
ClO_4^- + 2 H^+ + 2 e $\rightleftharpoons$ ClO_3^- H_2O	1.189
ClO_4^- + 8 H^+ + 7 e $\rightleftharpoons$ 1/2 Cl_2 + 4 H_2O	1.39
ClO_4^- + 8 H^+ + 8 e $\rightleftharpoons$ Cl^- + 4 H_2O	1.389
ClO_4^- + H_2O + 2 e $\rightleftharpoons$ ClO_3^- + 2 OH^-	0.36
Cm^{4+} + e $\rightleftharpoons$ Cm^{3+}	3.0
Cm^{3+} + 3 e $\rightleftharpoons$ Cm	–2.04
Co^{2+} + 2 e $\rightleftharpoons$ Co	–0.28
Co^{3+} + e $\rightleftharpoons$ Co^{2+}	1.92
$[Co(NH_3)_6]^{3+}$ + e $\rightleftharpoons$ $[Co(NH_3)_6]^{2+}$	0.108
$Co(OH)_2$ + 2 e $\rightleftharpoons$ Co + 2 OH^-	–0.73
$Co(OH)_3$ + e $\rightleftharpoons$ $Co(OH)_2$ + OH^-	0.17
Cr^{2+} + 2 e $\rightleftharpoons$ Cr	–0.913
Cr^{3+} + e $\rightleftharpoons$ Cr^{2+}	–0.407
Cr^{3+} + 3 e $\rightleftharpoons$ Cr	–0.744
$Cr_2O_7^{2-}$ + 14 H^+ + 6 e $\rightleftharpoons$ 2 Cr^{3+} + 7 H_2O	1.232
CrO_2^- + 2 H_2O + 3 e $\rightleftharpoons$ Cr + 4 OH^-	–1.2
$HCrO_4^-$ + 7 H^+ + 3 e $\rightleftharpoons$ Cr^{3+} + 4 H_2O	1.350
CrO_2 + 4 H^+ + e $\rightleftharpoons$ Cr^{3+} + 2H_2O	1.48
Cr(V) + e $\rightleftharpoons$ Cr(IV)	1.34
CrO_4^{2-} + 4 H_2O + 3 e $\rightleftharpoons$ $Cr(OH)_3$ + 5 OH^-	–0.13
$Cr(OH)_3$ + 3 e $\rightleftharpoons$ Cr + 3 OH^-	–1.48
Cs^+ + e $\rightleftharpoons$ Cs	–3.026
Cu^+ + e $\rightleftharpoons$ Cu	0.521
Cu^{2+} + e $\rightleftharpoons$ Cu^+	0.153
Cu^{2+} + 2 e $\rightleftharpoons$ Cu	0.3419
Cu^{2+} + 2 e $\rightleftharpoons$ Cu(Hg)	0.345
Cu^{3+} + e $\rightleftharpoons$ Cu^{2+}	2.4
Cu_2O_3 + 6 H^+ + 2e $\rightleftharpoons$ 2Cu^{2+} + 3 H_2O	2.0
Cu^{2+} + 2 CN^- + e $\rightleftharpoons$ $[Cu(CN)_2]^-$	1.103
CuI_2^- + e $\rightleftharpoons$ Cu + 2 I^-	0.00
Cu_2O + H_2O + 2 e $\rightleftharpoons$ 2 Cu + 2 OH^-	–0.360
$Cu(OH)_2$ + 2 e $\rightleftharpoons$ Cu + 2 OH^-	–0.222
2 $Cu(OH)_2$ + 2 e $\rightleftharpoons$ Cu_2O + 2 OH^- + H_2O	–0.080
2 D^+ + 2 e $\rightleftharpoons$ D_2	–0.013
Dy^{2+} + 2 e $\rightleftharpoons$ Dy	–2.2
Dy^{3+} + 3 e $\rightleftharpoons$ Dy	–2.295
Dy^{3+} + e $\rightleftharpoons$ Dy^{2+}	–2.6
Er^{2+} + 2 e $\rightleftharpoons$ Er	–2.0
Er^{3+} + 3 e $\rightleftharpoons$ Er	–2.331
Er^{3+} + e $\rightleftharpoons$ Er^{2+}	–3.0
Es^{3+} + e $\rightleftharpoons$ Es^{2+}	–1.3
Es^{3+} + 3 e $\rightleftharpoons$ Es	–1.91
Es^{2+} + 2 e $\rightleftharpoons$ Es	–2.23
Eu^{2+} + 2 e $\rightleftharpoons$ Eu	–2.812
Eu^{3+} + 3 e $\rightleftharpoons$ Eu	–1.991

TABLE 1
Alphabetical Listing (continued)

Reaction	$E°$/V
$Eu^{3+} + e \rightleftharpoons Eu^{2+}$	–0.36
$F_2 + 2\,H^+ + 2\,e \rightleftharpoons 2\,HF$	3.053
$F_2 + 2\,e \rightleftharpoons 2\,F^-$	2.866
$F_2O + 2\,H^+ + 4\,e \rightleftharpoons H_2O + 2\,F^-$	2.153
$Fe^{2+} + 2\,e \rightleftharpoons Fe$	–0.447
$Fe^{3+} + 3\,e \rightleftharpoons Fe$	–0.037
$Fe^{3+} + e \rightleftharpoons Fe^{2+}$	0.771
$2\,HFeO_4^- + 8\,H^+ + 6\,e \rightleftharpoons Fe_2O_3 + 5\,H_2O$	2.09
$HFeO_4^- + 4\,H^+ + 3\,e \rightleftharpoons FeOOH + 2\,H_2O$	2.08
$HFeO_4^- + 7\,H^+ + 3\,e \rightleftharpoons Fe^{3+} + 4\,H_2O$	2.07
$Fe_2O_3 + 4\,H^+ + 2\,e \rightleftharpoons 2\,FeOH^+ + H_2O$	0.16
$[Fe(CN)_6]^{3-} + e \rightleftharpoons [Fe(CN)_6]^{4-}$	0.358
$FeO_4^{2-} + 8\,H^+ + 3\,e \rightleftharpoons Fe^{3+} + 4\,H_2O$	2.20
$[Fe(bipy)_2]^{3+} + e \rightleftharpoons Fe(bipy)_2]^{2+}$	0.78
$[Fe(bipy)_3]^{3+} + e \rightleftharpoons Fe(bipy)_3]^{2+}$	1.03
$Fe(OH)_3 + e \rightleftharpoons Fe(OH)_2 + OH^-$	–0.56
$[Fe(phen)_3]^{3+} + e \rightleftharpoons [Fe(phen)_3]^{2+}$	1.147
$[Fe(phen)_3]^{3+} + e \rightleftharpoons [Fe(phen)_3]^{2+}$ (1 molar H_2SO_4)	1.06
[Ferricinium]$^+ + e \rightleftharpoons$ ferrocene	0.400
$Fm^{3+} + e \rightleftharpoons Fm^{2+}$	–1.1
$Fm^{3+} + 3\,e \rightleftharpoons Fm$	–1.89
$Fm^{2+} + 2\,e \rightleftharpoons Fm$	–2.30
$Fr^+ + e \rightleftharpoons Fr$	–2.9
$Ga^{3+} + 3\,e \rightleftharpoons Ga$	–0.549
$Ga^+ + e \rightleftharpoons Ga$	–0.2
$GaOH^{2+} + H^+ + 3\,e \rightleftharpoons Ga + H_2O$	–0.498
$H_2GaO^-_3 + H_2O + 3\,e \rightleftharpoons Ga + 4\,OH^-$	–1.219
$Gd^{3+} + 3\,e \rightleftharpoons Gd$	–2.279
$Ge^{2+} + 2\,e \rightleftharpoons Ge$	0.24
$Ge^{4+} + 4\,e \rightleftharpoons Ge$	0.124
$Ge^{4+} + 2\,e \rightleftharpoons Ge^{2+}$	0.00
$GeO_2 + 2\,H^+ + 2\,e \rightleftharpoons GeO + H_2O$	–0.118
$H_2GeO_3 + 4\,H^+ + 4\,e \rightleftharpoons Ge + 3\,H_2O$	–0.182
$2\,H^+ + 2\,e \rightleftharpoons H_2$	0.00000
$H_2 + 2\,e \rightleftharpoons 2\,H^-$	–2.23
$HO_2 + H^+ + e \rightleftharpoons H_2O_2$	1.495
$2\,H_2O + 2\,e \rightleftharpoons H_2 + 2\,OH^-$	–0.8277
$H_2O_2 + 2\,H^+ + 2\,e \rightleftharpoons 2\,H_2O$	1.776
$Hf^{4+} + 4\,e \rightleftharpoons Hf$	–1.55
$HfO^{2+} + 2\,H^+ + 4\,e \rightleftharpoons Hf + H_2O$	–1.724
$HfO_2 + 4\,H^+ + 4\,e \rightleftharpoons Hf + 2\,H_2O$	–1.505
$HfO(OH)_2 + H_2O + 4\,e \rightleftharpoons Hf + 4\,OH^-$	–2.50
$Hg^{2+} + 2\,e \rightleftharpoons Hg$	0.851
$2\,Hg^{2+} + 2\,e \rightleftharpoons Hg_2^{2+}$	0.920
$Hg_2^{2+} + 2\,e \rightleftharpoons 2\,Hg$	0.7973
$Hg_2(ac)_2 + 2\,e \rightleftharpoons 2\,Hg + 2(ac)^-$	0.51163
$Hg_2Br_2 + 2\,e \rightleftharpoons 2\,Hg + 2\,Br^-$	0.13923
$Hg_2Cl_2 + 2\,e \rightleftharpoons 2\,Hg + 2\,Cl^-$	0.26808
$Hg_2HPO_4 + 2\,e \rightleftharpoons 2\,Hg + HPO_4^{2-}$	0.6359
$Hg_2I_2 + 2\,e \rightleftharpoons 2\,Hg + 2\,I^-$	–0.0405
$Hg_2O + H_2O + 2\,e \rightleftharpoons 2\,Hg + 2\,OH^-$	0.123
$HgO + H_2O + 2\,e \rightleftharpoons Hg + 2\,OH^-$	0.0977
$Hg(OH)_2 + 2\,H^+ + 2\,e \rightleftharpoons Hg + 2\,H_2O$	1.034
$Hg_2SO_4 + 2\,e \rightleftharpoons 2\,Hg + SO_4^{2-}$	0.6125
$Ho^{2+} + 2\,e \rightleftharpoons Ho$	–2.1
$Ho^{3+} + 3\,e \rightleftharpoons Ho$	–2.33
$Ho^{3+} + e \rightleftharpoons Ho^{2+}$	–2.8
$I_2 + 2\,e \rightleftharpoons 2\,I^-$	0.5355
$I_3^- + 2\,e \rightleftharpoons 3\,I^-$	0.536
$H_3IO_6^{2-} + 2\,e \rightleftharpoons IO^-_3 + 3\,OH^-$	0.7
$H_5IO_6 + H^+ + 2\,e \rightleftharpoons IO_3^- + 3\,H_2O$	1.601
$2\,HIO + 2\,H^+ + 2\,e \rightleftharpoons I_2 + 2\,H_2O$	1.439
$HIO + H^+ + 2\,e \rightleftharpoons I^- + H_2O$	0.987
$IO^- + H_2O + 2\,e \rightleftharpoons I^- + 2\,OH^-$	0.485
$2\,IO_3^- + 12\,H^+ + 10\,e \rightleftharpoons I_2 + 6\,H_2O$	1.195
$IO_3^- + 6\,H^+ + 6\,e \rightleftharpoons I^- + 3\,H_2O$	1.085
$IO_3^- + 2\,H_2O + 4\,e \rightleftharpoons IO^- + 4\,OH^-$	0.15
$IO_3^- + 3\,H_2O + 6\,e \rightleftharpoons IO^- + 6\,OH^-$	0.26
$In^+ + e \rightleftharpoons In$	–0.14
$In^{2+} + e \rightleftharpoons In^+$	–0.40
$In^{3+} + e \rightleftharpoons In^{2+}$	–0.49
$In^{3+} + 2\,e \rightleftharpoons In^+$	–0.443
$In^{3+} + 3\,e \rightleftharpoons In$	–0.3382
$In(OH)_3 + 3\,e \rightleftharpoons In + 3\,OH^-$	–0.99
$In(OH)_4^- + 3\,e \rightleftharpoons In + 4\,OH^-$	–1.007
$In_2O_3 + 3\,H_2O + 6\,e \rightleftharpoons 2\,In + 6\,OH^-$	–1.034
$Ir^{3+} + 3\,e \rightleftharpoons Ir$	1.156
$[IrCl_6]^{2-} + e \rightleftharpoons [IrCl_6]^{3-}$	0.8665
$[IrCl_6]^{3-} + 3\,e \rightleftharpoons Ir + 6\,Cl^-$	0.77
$Ir_2O_3 + 3\,H_2O + 6\,e \rightleftharpoons 2\,Ir + 6\,OH^-$	0.098
$K^+ + e \rightleftharpoons K$	–2.931
$La^{3+} + 3\,e \rightleftharpoons La$	–2.379
$La(OH)_3 + 3\,e \rightleftharpoons La + 3\,OH^-$	–2.90
$Li^+ + e \rightleftharpoons Li$	–3.0401
$Lr^{3+} + 3\,e \rightleftharpoons Lr$	–1.96
$Lu^{3+} + 3\,e \rightleftharpoons Lu$	–2.28
$Md^{3+} + e \rightleftharpoons Md^{2+}$	–0.1
$Md^{3+} + 3\,e \rightleftharpoons Md$	–1.65
$Md^{2+} + 2\,e \rightleftharpoons Md$	–2.40
$Mg^+ + e \rightleftharpoons Mg$	–2.70
$Mg^{2+} + 2\,e \rightleftharpoons Mg$	–2.372
$Mg(OH)_2 + 2\,e \rightleftharpoons Mg + 2\,OH^-$	–2.690
$Mn^{2+} + 2\,e \rightleftharpoons Mn$	–1.185
$Mn^{3+} + e \rightleftharpoons Mn^{2+}$	1.5415
$MnO_2 + 4\,H^+ + 2\,e \rightleftharpoons Mn^{2+} + 2\,H_2O$	1.224
$MnO_4^- + e \rightleftharpoons MnO_4^{2-}$	0.558
$MnO_4^- + 4\,H^+ + 3\,e \rightleftharpoons MnO_2 + 2\,H_2O$	1.679
$MnO_4^- + 8\,H^+ + 5\,e \rightleftharpoons Mn^{2+} + 4\,H_2O$	1.507
$MnO_4^- + 2\,H_2O + 3\,e \rightleftharpoons MnO_2 + 4\,OH^-$	0.595
$MnO_4^{2-} + 2\,H_2O + 2\,e \rightleftharpoons MnO_2 + 4\,OH^-$	0.60
$Mn(OH)_2 + 2\,e \rightleftharpoons Mn + 2\,OH^-$	–1.56
$Mn(OH)_3 + e \rightleftharpoons Mn(OH)_2 + OH^-$	0.15
$Mn_2O_3 + 6\,H^+ + e \rightleftharpoons 2\,Mn^{2+} + 3\,H_2O$	1.485
$Mo^{3+} + 3\,e \rightleftharpoons Mo$	–0.200
$MoO_2 + 4\,H^+ + 4\,e \rightleftharpoons Mo + 4\,H_2O$	–0.152
$H_3Mo_7O_{24}^{3-} + 45\,H^+ + 42\,e \rightleftharpoons 7\,Mo + 24\,H_2O$	0.082
$MoO_3 + 6\,H^+ + 6\,e \rightleftharpoons Mo + 3\,H_2O$	0.075
$N_2 + 2\,H_2O + 6\,H^+ + 6\,e \rightleftharpoons 2\,NH_4OH$	0.092
$3\,N_2 + 2\,H^+ + 2\,e \rightleftharpoons 2\,HN_3$	–3.09
$N_5^+ + 3\,H^+ + 2\,e \rightleftharpoons 2\,NH_4^+$	1.275

DropBooks

TABLE 1
Alphabetical Listing (continued)

Reaction	$E°$/V
$N_2O + 2\ H^+ + 2\ e \rightleftharpoons N_2 + H_2O$	1.766
$H_2N_2O_2 + 2\ H^+ + 2\ e \rightleftharpoons N_2 + 2\ H_2O$	2.65
$N_2O_4 + 2\ e \rightleftharpoons 2\ NO_2^-$	0.867
$N_2O_4 + 2\ H^+ + 2\ e \rightleftharpoons 2\ NHO_2$	1.065
$N_2O_4 + 4\ H^+ + 4\ e \rightleftharpoons 2\ NO + 2\ H_2O$	1.035
$2\ NH_3OH^+ + H^+ + 2\ e \rightleftharpoons N_2H_5^+ + 2\ H_2O$	1.42
$2\ NO + 2\ H^+ + 2\ e \rightleftharpoons N_2O + H_2O$	1.591
$2\ NO + H_2O + 2\ e \rightleftharpoons N_2O + 2\ OH^-$	0.76
$HNO_2 + H^+ + e \rightleftharpoons NO + H_2O$	0.983
$2\ HNO_2 + 4\ H^+ + 4\ e \rightleftharpoons H_2N_2O_2 + 2\ H_2O$	0.86
$2\ HNO_2 + 4\ H^+ + 4\ e \rightleftharpoons N_2O + 3\ H_2O$	1.297
$NO_2^- + H_2O + e \rightleftharpoons NO + 2\ OH^-$	–0.46
$2\ NO_2^- + 2\ H_2O + 4\ e \rightleftharpoons N_2O_2^{2-} + 4\ OH^-$	–0.18
$2\ NO_2^- + 3\ H_2O + 4\ e \rightleftharpoons N_2O + 6\ OH^-$	0.15
$NO_3^- + 3\ H^+ + 2\ e \rightleftharpoons HNO_2 + H_2O$	0.934
$NO_3^- + 4\ H^+ + 3\ e \rightleftharpoons NO + 2\ H_2O$	0.957
$2\ NO_3^- + 4\ H^+ + 2\ e \rightleftharpoons N_2O_4 + 2\ H_2O$	0.803
$NO_3^- + H_2O + 2\ e \rightleftharpoons NO_2^- + 2\ OH^-$	0.01
$2\ NO_3^- + 2\ H_2O + 2\ e \rightleftharpoons N_2O_4 + 4\ OH^-$	–0.85
$Na^+ + e \rightleftharpoons Na$	–2.71
$Nb^{3+} + 3\ e \rightleftharpoons Nb$	–1.099
$NbO_2 + 2\ H^+ + 2\ e \rightleftharpoons NbO + H_2O$	–0.646
$NbO_2 + 4\ H^+ + 4\ e \rightleftharpoons Nb + 2\ H_2O$	–0.690
$NbO + 2\ H^+ + 2\ e \rightleftharpoons Nb + H_2O$	–0.733
$Nb_2O_5 + 10\ H^+ + 10\ e \rightleftharpoons 2\ Nb + 5\ H_2O$	–0.644
$Nd^{3+} + 3\ e \rightleftharpoons Nd$	–2.323
$Nd^{2+} + 2\ e \rightleftharpoons Nd$	–2.1
$Nd^{3+} + e \rightleftharpoons Nd^{2+}$	–2.7
$Ni^{2+} + 2\ e \rightleftharpoons Ni$	–0.257
$Ni(OH)_2 + 2\ e \rightleftharpoons Ni + 2\ OH^-$	–0.72
$NiO_2 + 4\ H^+ + 2\ e \rightleftharpoons Ni^{2+} + 2\ H_2O$	1.678
$NiO_2 + 2\ H_2O + 2\ e \rightleftharpoons Ni(OH)_2 + 2\ OH^-$	–0.490
$No^{3+} + e \rightleftharpoons No^{2+}$	1.4
$No^{3+} + 3\ e \rightleftharpoons No$	–1.20
$No^{2+} + 2\ e \rightleftharpoons No$	–2.50
$Np^{3+} + 3\ e \rightleftharpoons Np$	–1.856
$Np^{4+} + e \rightleftharpoons Np^{3+}$	0.147
$NpO_2 + H_2O + H^+ + e \rightleftharpoons Np(OH)_3$	–0.962
$O_2 + 2\ H^+ + 2\ e \rightleftharpoons H_2O_2$	0.695
$O_2 + 4\ H^+ + 4\ e \rightleftharpoons 2\ H_2O$	1.229
$O_2 + H_2O + 2\ e \rightleftharpoons HO_2^- + OH^-$	–0.076
$O_2 + 2\ H_2O + 2\ e \rightleftharpoons H_2O_2 + 2\ OH^-$	–0.146
$O_2 + 2\ H_2O + 4\ e \rightleftharpoons 4\ OH^-$	0.401
$O_3 + 2\ H^+ + 2\ e \rightleftharpoons O_2 + H_2O$	2.076
$O_3 + H_2O + 2\ e \rightleftharpoons O_2 + 2\ OH^-$	1.24
$O(g) + 2\ H^+ + 2\ e \rightleftharpoons H_2O$	2.421
$OH + e \rightleftharpoons OH^-$	2.02
$HO_2^- + H_2O + 2\ e \rightleftharpoons 3\ OH^-$	0.878
$OsO_4 + 8\ H^+ + 8\ e \rightleftharpoons Os + 4\ H_2O$	0.838
$OsO_4 + 4\ H^+ + 4\ e \rightleftharpoons OsO_2 + 2\ H_2O$	1.02
$[Os(bipy)_2]^{3+} + e \rightleftharpoons [Os(bipy)_2]^{2+}$	0.81
$[Os(bipy)_3]^{3+} + e \rightleftharpoons [Os(bipy)_3]^{2+}$	0.80
$P(red) + 3\ H^+ + 3\ e \rightleftharpoons PH_3(g)$	–0.111
$P(white) + 3\ H^+ + 3\ e \rightleftharpoons PH_3(g)$	–0.063
$P + 3\ H_2O + 3\ e \rightleftharpoons PH_3(g) + 3\ OH^-$	–0.87

Reaction	$E°$/V
$H_2P_2^- + e \rightleftharpoons P + 2\ OH^-$	–1.82
$H_3PO_2 + H^+ + e \rightleftharpoons P + 2\ H_2O$	–0.508
$H_3PO_3 + 2\ H^+ + 2\ e \rightleftharpoons H_3PO_2 + H_2O$	–0.499
$H_3PO_3 + 3\ H^+ + 3\ e \rightleftharpoons P + 3\ H_2O$	–0.454
$HPO_3^{2-} + 2\ H_2O + 2\ e \rightleftharpoons H_2PO_2^- + 3\ OH^-$	–1.65
$HPO_3^{2-} + 2\ H_2O + 3\ e \rightleftharpoons P + 5\ OH^-$	–1.71
$H_3PO_4 + 2\ H^+ + 2\ e \rightleftharpoons H_3PO_3 + H_2O$	–0.276
$PO_4^{3-} + 2\ H_2O + 2\ e \rightleftharpoons HPO_3^{2-} + 3\ OH^-$	–1.05
$Pa^{3+} + 3\ e \rightleftharpoons Pa$	–1.34
$Pa^{4+} + 4\ e \rightleftharpoons Pa$	–1.49
$Pa^{4+} + e \rightleftharpoons Pa^{3+}$	–1.9
$Pb^{2+} + 2\ e \rightleftharpoons Pb$	–0.1262
$Pb^{2+} + 2\ e \rightleftharpoons Pb(Hg)$	–0.1205
$PbBr_2 + 2\ e \rightleftharpoons Pb + 2\ Br^-$	–0.284
$PbCl_2 + 2\ e \rightleftharpoons Pb + 2\ Cl^-$	–0.2675
$PbF_2 + 2\ e \rightleftharpoons Pb + 2\ F^-$	–0.3444
$PbHPO_4 + 2\ e \rightleftharpoons Pb + HPO_4^{2-}$	–0.465
$PbI_2 + 2\ e \rightleftharpoons Pb + 2\ I^-$	–0.365
$PbO + H_2O + 2\ e \rightleftharpoons Pb + 2\ OH^-$	–0.580
$PbO_2 + 4\ H^+ + 2\ e \rightleftharpoons Pb^{2+} + 2\ H_2O$	1.455
$HPbO_2^- + H_2O + 2\ e \rightleftharpoons Pb + 3\ OH^-$	–0.537
$PbO_2 + H_2O + 2\ e \rightleftharpoons PbO + 2\ OH^-$	0.247
$PbO_2 + SO_4^{2-} + 4\ H^+ + 2\ e \rightleftharpoons PbSO_4 + 2\ H_2O$	1.6913
$PbSO_4 + 2\ e \rightleftharpoons Pb + SO_4^{2-}$	–0.3588
$PbSO_4 + 2\ e \rightleftharpoons Pb(Hg) + SO_4^{2-}$	–0.3505
$Pd^{2+} + 2\ e \rightleftharpoons Pd$	0.951
$[PdCl_4]^{2-} + 2\ e \rightleftharpoons Pd + 4\ Cl^-$	0.591
$[PdCl_6]^{2-} + 2\ e \rightleftharpoons [PdCl_4]^{2-} + 2\ Cl^-$	1.288
$Pd(OH)_2 + 2\ e \rightleftharpoons Pd + 2\ OH^-$	0.07
$Pm^{2+} + 2\ e \rightleftharpoons Pm$	–2.2
$Pm^{3+} + 3\ e \rightleftharpoons Pm$	–2.30
$Pm^{3+} + e \rightleftharpoons Pm^{2+}$	–2.6
$Po^{4+} + 2\ e \rightleftharpoons Po^{2+}$	0.9
$Po^{4+} + 4\ e \rightleftharpoons Po$	0.76
$Pr^{4+} + e \rightleftharpoons Pr^{3+}$	3.2
$Pr^{2+} + 2\ e \rightleftharpoons Pr$	–2.0
$Pr^{3+} + 3\ e \rightleftharpoons Pr$	–2.353
$Pr^{3+} + e \rightleftharpoons Pr^{2+}$	–3.1
$Pt^{2+} + 2\ e \rightleftharpoons Pt$	1.18
$[PtCl_4]^{2-} + 2\ e \rightleftharpoons Pt + 4\ Cl^-$	0.755
$[PtCl_6]^{2-} + 2\ e \rightleftharpoons [PtCl_4]^{2-} + 2\ Cl^-$	0.68
$Pt(OH)_2 + 2\ e \rightleftharpoons Pt + 2\ OH^-$	0.14
$PtO_3 + 2\ H^+ + 2\ e \rightleftharpoons PtO_2 + H_2O$	1.7
$PtO_3 + 4\ H^+ + 2\ e \rightleftharpoons Pt(OH)_2^{2+} + H_2O$	1.5
$PtOH^+ + H^+ + 2\ e \rightleftharpoons Pt + H_2O$	1.2
$PtO_2 + 2\ H^+ + 2\ e \rightleftharpoons PtO + H_2O$	1.01
$PtO_2 + 4\ H^+ + 4\ e \rightleftharpoons Pt + 2\ H_2O$	1.00
$Pu^{3+} + 3\ e \rightleftharpoons Pu$	–2.031
$Pu^{4+} + e \rightleftharpoons Pu^{3+}$	1.006
$Pu^{5+} + e \rightleftharpoons Pu^{4+}$	1.099
$PuO_2(OH)_2 + 2\ H^+ + 2\ e \rightleftharpoons Pu(OH)_4$	1.325
$PuO_2(OH)_2 + H^+ + e \rightleftharpoons PuO_2OH + H_2O$	1.062
$Ra^{2+} + 2\ e \rightleftharpoons Ra$	–2.8
$Rb^+ + e \rightleftharpoons Rb$	–2.98
$Re^{3+} + 3\ e \rightleftharpoons Re$	0.300

TABLE 1
Alphabetical Listing (continued)

Reaction	$E°$/V
$ReO_4^- + 4\,H^+ + 3\,e \rightleftharpoons ReO_2 + 2\,H_2O$	0.510
$ReO_2 + 4\,H^+ + 4\,e \rightleftharpoons Re + 2\,H_2O$	0.2513
$ReO_4^- + 2\,H^+ + e \rightleftharpoons ReO_3 + H_2O$	0.768
$ReO_4^- + 4\,H_2O + 7\,e \rightleftharpoons Re + 8\,OH^-$	–0.584
$ReO_4^- + 8\,H^+ + 7\,e \rightleftharpoons Re + 4\,H_2O$	0.368
$Rh^+ + e \rightleftharpoons Rh$	0.600
$Rh^+ + 2e \rightleftharpoons Rh$	0.600
$Rh^{3+} + 3\,e \rightleftharpoons Rh$	0.758
$[RhCl_6]^{3-} + 3\,e \rightleftharpoons Rh + 6\,Cl^-$	0.431
$RhOH^{2+} + H^+ + 3\,e \rightleftharpoons Rh + H_2O$	0.83
$Ru^{2+} + 2\,e \rightleftharpoons Ru$	0.455
$Ru^{3+} + e \rightleftharpoons Ru^{2+}$	0.2487
$RuO_2 + 4\,H^+ + 2\,e \rightleftharpoons Ru^{2+} + 2\,H_2O$	1.120
$RuO_4^- + e \rightleftharpoons RuO_4^{2-}$	0.59
$RuO_4 + e \rightleftharpoons RuO_4^-$	1.00
$RuO_4 + 6\,H^+ + 4\,e \rightleftharpoons Ru(OH)_2^{2+} + 2\,H_2O$	1.40
$RuO_4 + 8\,H^+ + 8\,e \rightleftharpoons Ru + 4\,H_2O$	1.038
$[Ru(bipy)_3)^{3+} + e^- \rightleftharpoons [Ru(bipy)_3]^{2+}$	1.24
$[Ru(H_2O)_6]^{3+} + e^- \rightleftharpoons [Ru(H_2O)_6]^{2+}$	0.23
$[Ru(NH_3)_6]^{3+} + e^- \rightleftharpoons [Ru(NH_3)_6]^{2+}$	0.10
$[Ru(en)_3]^{3+} + e^- \rightleftharpoons [Ru(en)_3]^{2+}$	0.210
$[Ru(CN)_6]^{3-} + e^- \rightleftharpoons [Ru(CN)_6]^{4-}$	0.86
$S + 2\,e \rightleftharpoons S^{2-}$	–0.47627
$S + 2H^+ + 2\,e \rightleftharpoons H_2S(aq)$	0.142
$S + H_2O + 2\,e \rightleftharpoons SH^- + OH^-$	–0.478
$2\,S + 2\,e \rightleftharpoons S_2^{2-}$	–0.42836
$S_2O_6^{2-} + 4\,H^+ + 2\,e \rightleftharpoons 2\,H_2SO_3$	0.564
$S_2O_8^{2-} + 2\,e \rightleftharpoons 2\,SO_4^{2-}$	2.010
$S_2O_8^{2-} + 2\,H^+ + 2\,e \rightleftharpoons 2\,HSO_4^-$	2.123
$S_4O_6^{2-} + 2\,e \rightleftharpoons 2\,S_2O_3^{2-}$	0.08
$2\,H_2SO_3 + H^+ + 2\,e \rightleftharpoons HS_2O_4^- + 2\,H_2O$	–0.056
$H_2SO_3 + 4\,H^+ + 4\,e \rightleftharpoons S + 3\,H_2O$	0.449
$2\,SO_3^{2-} + 2\,H_2O + 2\,e \rightleftharpoons S_2O_4^{2-} + 4\,OH^-$	–1.12
$2\,SO_3^{2-} + 3\,H_2O + 4\,e \rightleftharpoons S_2O_3^{2-} + 6\,OH^-$	–0.571
$SO_4^{2-} + 4\,H^+ + 2\,e \rightleftharpoons H_2SO_3 + H_2O$	0.172
$2\,SO_4^{2-} + 4\,H^+ + 2\,e \rightleftharpoons S_2O_6^{2-} + H_2O$	–0.22
$SO_4^{2-} + H_2O + 2\,e \rightleftharpoons SO_3^{2-} + 2\,OH^-$	–0.93
$Sb + 3\,H^+ + 3\,e \rightleftharpoons SbH_3$	–0.510
$Sb_2O_3 + 6\,H^+ + 6\,e \rightleftharpoons 2\,Sb + 3\,H_2O$	0.152
Sb_2O_5 (senarmontite) $+ 4\,H^+ + 4\,e \rightleftharpoons Sb_2O_3 + 2\,H_2O$	0.671
Sb_2O_5 (valentinite) $+ 4\,H^+ + 4\,e \rightleftharpoons Sb_2O_3 + 2\,H_2O$	0.649
$Sb_2O_5 + 6\,H^+ + 4\,e \rightleftharpoons 2\,SbO^+ + 3\,H_2O$	0.581
$SbO^+ + 2\,H^+ + 3\,e \rightleftharpoons Sb + 2\,H_2O$	0.212
$SbO_2^- + 2\,H_2O + 3\,e \rightleftharpoons Sb + 4\,OH^-$	–0.66
$SbO_3^- + H_2O + 2\,e \rightleftharpoons SbO_2^- + 2\,OH^-$	–0.59
$Sc^{3+} + 3\,e \rightleftharpoons Sc$	–2.077
$Se + 2\,e \rightleftharpoons Se^{2-}$	–0.924
$Se + 2\,H^+ + 2\,e \rightleftharpoons H_2Se(aq)$	–0.399
$H_2SeO_3 + 4\,H^+ + 4\,e \rightleftharpoons Se + 3\,H_2O$	0.74
$Se + 2\,H^+ + 2\,e \rightleftharpoons H_2Se$	–0.082
$SeO_3^{2-} + 3\,H_2O + 4\,e \rightleftharpoons Se + 6\,OH^-$	–0.366
$SeO_4^{2-} + 4\,H^+ + 2\,e \rightleftharpoons H_2SeO_3 + H_2O$	1.151
$SeO_4^{2-} + H_2O + 2\,e \rightleftharpoons SeO_3^{2-} + 2\,OH^-$	0.05
$SiF_6^{2-} + 4\,e \rightleftharpoons Si + 6\,F^-$	–1.24
$SiO + 2\,H^+ + 2\,e \rightleftharpoons Si + H_2O$	–0.8
SiO_2 (quartz) $+ 4\,H^+ + 4\,e \rightleftharpoons Si + 2\,H_2O$	0.857
$SiO_3^{2-} + 3\,H_2O + 4\,e \rightleftharpoons Si + 6\,OH^-$	–1.697
$Sm^{3+} + e \rightleftharpoons Sm^{2+}$	–1.55
$Sm^{3+} + 3\,e \rightleftharpoons Sm$	–2.304
$Sm^{2+} + 2\,e \rightleftharpoons Sm$	–2.68
$Sn^{2+} + 2\,e \rightleftharpoons Sn$	–0.1375
$Sn^{4+} + 2\,e \rightleftharpoons Sn^{2+}$	0.151
$Sn(OH)_3^+ + 3\,H^+ + 2\,e \rightleftharpoons Sn^{2+} + 3\,H_2O$	0.142
$SnO_2 + 4\,H^+ + 2\,e^- \rightleftharpoons Sn^{2+} + 2\,H_2O$	–0.094
$SnO_2 + 4\,H^+ + 4\,e \rightleftharpoons Sn + 2\,H_2O$	–0.117
$SnO_2 + 3\,H^+ + 2\,e \rightleftharpoons SnOH^+ + H_2O$	–0.194
$SnO_2 + 2\,H_2O + 4\,e \rightleftharpoons Sn + 4\,OH^-$	–0.945
$HSnO_2^- + H_2O + 2\,e \rightleftharpoons Sn + 3\,OH^-$	–0.909
$Sn(OH)_6^{2-} + 2\,e \rightleftharpoons HSnO_2^- + 3\,OH^- + H_2O$	–0.93
$Sr^+ + e \rightleftharpoons Sr$	–4.10
$Sr^{2+} + 2\,e \rightleftharpoons Sr$	–2.899
$Sr^{2+} + 2\,e \rightleftharpoons Sr(Hg)$	–1.793
$Sr(OH)_2 + 2\,e \rightleftharpoons Sr + 2\,OH^-$	–2.88
$Ta_2O_5 + 10\,H^+ + 10\,e \rightleftharpoons 2\,Ta + 5\,H_2O$	–0.750
$Ta^{3+} + 3\,e \rightleftharpoons Ta$	–0.6
$Tc^{2+} + 2\,e \rightleftharpoons Tc$	0.400
$TcO_4^- + 4\,H^+ + 3\,e \rightleftharpoons TcO_2 + 2\,H_2O$	0.782
$Tc^{3+} + e \rightleftharpoons Tc^{2+}$	0.3
$TcO_4^- + 8\,H^+ + 7\,e \rightleftharpoons Tc + 4\,H_2O$	0.472
$Tb^{4+} + e \rightleftharpoons Tb^{3+}$	3.1
$Tb^{3+} + 3\,e \rightleftharpoons Tb$	–2.28
$Te + 2\,e \rightleftharpoons Te^{2-}$	–1.143
$Te + 2\,H^+ + 2\,e \rightleftharpoons H_2Te$	–0.793
$Te^{4+} + 4\,e \rightleftharpoons Te$	0.568
$TeO_2 + 4\,H^+ + 4\,e \rightleftharpoons Te + 2\,H_2O$	0.593
$TeO_3^{2-} + 3\,H_2O + 4\,e \rightleftharpoons Te + 6\,OH^-$	–0.57
$TeO_4^- + 8\,H^+ + 7\,e \rightleftharpoons Te + 4\,H_2O$	0.472
$H_6TeO_6 + 2\,H^+ + 2\,e \rightleftharpoons TeO_2 + 4\,H_2O$	1.02
$Th^{4+} + 4\,e \rightleftharpoons Th$	–1.899
$ThO_2 + 4\,H^+ + 4\,e \rightleftharpoons Th + 2\,H_2O$	–1.789
$Th(OH)_4 + 4\,e \rightleftharpoons Th + 4\,OH^-$	–2.48
$Ti^{2+} + 2\,e \rightleftharpoons Ti$	–1.630
$Ti^{3+} + e \rightleftharpoons Ti^{2+}$	–0.9
$TiO_2 + 4\,H^+ + 2\,e \rightleftharpoons Ti^{2+} + 2\,H_2O$	–0.502
$Ti^{3+} + 3\,e \rightleftharpoons Ti$	–1.37
$TiOH^{3+} + H^+ + e \rightleftharpoons Ti^{3+} + H_2O$	–0.055
$Tl^+ + e \rightleftharpoons Tl$	–0.336
$Tl^+ + e \rightleftharpoons Tl(Hg)$	–0.3338
$Tl^{3+} + 2\,e \rightleftharpoons Tl^+$	1.252
$Tl^{3+} + 3\,e \rightleftharpoons Tl$	0.741
$TlBr + e \rightleftharpoons Tl + Br^-$	–0.658
$TlCl + e \rightleftharpoons Tl + Cl^-$	–0.5568
$TlI + e \rightleftharpoons Tl + I^-$	–0.752
$Tl_2O_3 + 3\,H_2O + 4\,e \rightleftharpoons 2\,Tl^+ + 6\,OH^-$	0.02
$TlOH + e \rightleftharpoons Tl + OH^-$	–0.34
$Tl(OH)_3 + 2\,e \rightleftharpoons TlOH + 2\,OH^-$	–0.05
$Tl_2SO_4 + 2\,e \rightleftharpoons Tl + SO_4^{2-}$	–0.4360
$Tm^{3+} + e \rightleftharpoons Tm^{2+}$	–2.2
$Tm^{3+} + 3\,e \rightleftharpoons Tm$	–2.319
$Tm^{2+} + 2\,e \rightleftharpoons Tm$	–2.4

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TABLE 1
Alphabetical Listing (continued)

Reaction	E°/V
$U^{3+} + 3\ e \rightleftharpoons U$	–1.798
$U^{4+} + e \rightleftharpoons U^{3+}$	–0.607
$UO_2^+ + 4\ H^+ + e \rightleftharpoons U^{4+} + 2\ H_2O$	0.612
$UO_2^{2+} + e \rightleftharpoons UO^+_2$	0.062
$UO_2^{2+} + 4\ H^+ + 2\ e \rightleftharpoons U^{4+} + 2\ H_2O$	0.327
$UO_2^{2+} + 4\ H^+ + 6\ e \rightleftharpoons U + 2\ H_2O$	–1.444
$V^{2+} + 2\ e \rightleftharpoons V$	–1.175
$V^{3+} + e \rightleftharpoons V^{2+}$	–0.255
$VO^{2+} + 2\ H^+ + e \rightleftharpoons V^{3+} + H_2O$	0.337
$VO_2^+ + 2\ H^+ + e \rightleftharpoons VO^{2+} + H_2O$	0.991
$V_2O_5 + 6\ H^+ + 2\ e \rightleftharpoons 2\ VO^{2+} + 3\ H_2O$	0.957
$V_2O_5 + 10\ H^+ + 10\ e \rightleftharpoons 2\ V + 5\ H_2O$	–0.242
$V(OH)_4^+ + 2\ H^+ + e \rightleftharpoons VO^{2+} + 3\ H_2O$	1.00
$V(OH)_4^+ + 4\ H^+ + 5\ e \rightleftharpoons V + 4\ H_2O$	–0.254
$[V(phen)_3]^{3+} + e \rightleftharpoons [V(phen)_3]^{2+}$	0.14
$W^{3+} + 3\ e \rightleftharpoons W$	0.1
$W_2O_5 + 2\ H^+ + 2\ e \rightleftharpoons 2\ WO_2 + H_2O$	–0.031
$WO_2 + 4\ H^+ + 4\ e \rightleftharpoons W + 2\ H_2O$	–0.119
$WO_3 + 6\ H^+ + 6\ e \rightleftharpoons W + 3\ H_2O$	–0.090
$WO_3 + 2\ H^+ + 2\ e \rightleftharpoons WO_2 + H_2O$	0.036
$2\ WO_3 + 2\ H^+ + 2\ e \rightleftharpoons W_2O_5 + H_2O$	–0.029
$H_4XeO_6 + 2\ H^+ + 2\ e \rightleftharpoons XeO_3 + 3\ H_2O$	2.42
$XeO_3 + 6\ H^+ + 6\ e \rightleftharpoons Xe + 3\ H_2O$	2.10
$XeF + e \rightleftharpoons Xe + F^-$	3.4
$Y^{3+} + 3\ e \rightleftharpoons Y$	–2.372
$Yb^{3+} + e \rightleftharpoons Yb^{2+}$	–1.05
$Yb^{3+} + 3\ e \rightleftharpoons Yb$	–2.19
$Yb^{2+} + 2\ e \rightleftharpoons Yb$	–2.76
$Zn^{2+} + 2\ e \rightleftharpoons Zn$	–0.7618
$Zn^{2+} + 2\ e \rightleftharpoons Zn(Hg)$	–0.7628
$ZnO_2^{2-} + 2\ H_2O + 2\ e \rightleftharpoons Zn + 4\ OH^-$	–1.215
$ZnSO_4 \cdot 7\ H_2O + 2\ e = Zn(Hg) + SO_4^{2-} + 7\ H_2O$ (Saturated $ZnSO_4$)	–0.7993
$ZnOH^+ + H^+ + 2\ e \rightleftharpoons Zn + H_2O$	–0.497
$Zn(OH)_4^{2-} + 2\ e \rightleftharpoons Zn + 4\ OH^-$	–1.199
$Zn(OH)_2 + 2\ e \rightleftharpoons Zn + 2\ OH^-$	–1.249
$ZnO + H_2O + 2\ e \rightleftharpoons Zn + 2\ OH^-$	–1.260
$ZrO_2 + 4\ H^+ + 4\ e \rightleftharpoons Zr + 2\ H_2O$	–1.553
$ZrO(OH)_2 + H_2O + 4\ e \rightleftharpoons Zr + 4\ OH^-$	–2.36
$Zr^{4+} + 4\ e \rightleftharpoons Zr$	–1.45

TABLE 2
Reduction Reactions Having E° Values More Positive than that of the Standard Hydrogen Electrode

Reaction	E°/V
$2\ H^+ + 2\ e \rightleftharpoons H_2$	0.00000
$CuI_2^- + e \rightleftharpoons Cu + 2\ I^-$	0.00
$Ge^{4+} + 2\ e \rightleftharpoons Ge^{2+}$	0.00
$NO_3^- + H_2O + 2\ e \rightleftharpoons NO_2^- + 2\ OH^-$	0.01
$Tl_2O_3 + 3\ H_2O + 4\ e \rightleftharpoons 2\ Tl^+ + 6\ OH^-$	0.02
$SeO_4^{2-} + H_2O + 2\ e \rightleftharpoons SeO_3^{2-} + 2\ OH^-$	0.05
$WO_3 + 2\ H^+ + 2\ e \rightleftharpoons WO_2 + H_2O$	0.036
$UO_2^{2+} + e = UO_2^+$	0.062
$Pd(OH)_2 + 2\ e \rightleftharpoons Pd + 2\ OH^-$	0.07
$AgBr + e \rightleftharpoons Ag + Br^-$	0.07133
$MoO_3 + 6\ H^+ + 6\ e \rightleftharpoons Mo + 3\ H_2O$	0.075
$S_4O_6^{2-} + 2\ e \rightleftharpoons 2\ S_2O_3^{2-}$	0.08
$H_3Mo_7O_{24}^{3-} + 45\ H^+ + 42\ e \rightleftharpoons 7\ Mo + 24\ H_2O$	0.082
$AgSCN + e \rightleftharpoons Ag + SCN^-$	0.8951
$N_2 + 2\ H_2O + 6\ H^+ + 6\ e \rightleftharpoons 2\ NH_4OH$	0.092
$HgO + H_2O + 2\ e \rightleftharpoons Hg + 2\ OH^-$	0.0977
$Ir_2O_3 + 3\ H_2O + 6\ e \rightleftharpoons 2\ Ir + 6\ OH^-$	0.098
$2\ NO + 2\ e \rightleftharpoons N_2O_2^{2-}$	0.10
$[Ru(NH_3)_6]^{3+} + e \rightleftharpoons [Ru(NH_3)_6]^{2+}$	0.10
$W^{3+} + 3\ e \rightleftharpoons W$	0.1
$[Co(NH_3)_6]^{3+} + e \rightleftharpoons [Co(NH_3)_6]^{2+}$	0.108
$Hg_2O + H_2O + 2\ e \rightleftharpoons 2\ Hg + 2\ OH^-$	0.123
$Ge^{4+} + 4\ e \rightleftharpoons Ge$	0.124
$Hg_2Br_2 + 2\ e \rightleftharpoons 2\ Hg + 2\ Br^-$	0.13923
$Pt(OH)_2 + 2\ e \rightleftharpoons Pt + 2\ OH^-$	0.14
$[V(phen)_3]^{3+} + e \rightleftharpoons [V(phen)_3]^{2+}$	0.14
$S + 2H^+ + 2\ e \rightleftharpoons H_2S(aq)$	0.142
$Sn(OH)_3^+ + 3\ H^+ + 2\ e \rightleftharpoons Sn^{2+} + 3\ H_2O$	0.142
$Np^{4+} + e \rightleftharpoons Np^{3+}$	0.147
$Ag_4[Fe(CN)_6] + 4\ e \rightleftharpoons 4\ Ag + [Fe(CN)_6]^{4-}$	0.1478
$IO_3^- + 2\ H_2O + 4\ e \rightleftharpoons IO^- + 4\ OH^-$	0.15
$Mn(OH)_3 + e \rightleftharpoons Mn(OH)_2 + OH^-$	0.15
$2\ NO_2^- + 3\ H_2O + 4\ e \rightleftharpoons N_2O + 6\ OH^-$	0.15
$Sn^{4+} + 2\ e \rightleftharpoons Sn^{2+}$	0.151
$Sb_2O_3 + 6\ H^+ + 6\ e \rightleftharpoons 2\ Sb + 3\ H_2O$	0.152
$Cu^{2+} + e \rightleftharpoons Cu^+$	0.153
$BiOCl + 2\ H^+ + 3\ e \rightleftharpoons Bi + Cl^- + H_2O$	0.1583
$BiCl_4^- + 3\ e \rightleftharpoons Bi + 4\ Cl^-$	0.16
$Fe_2O_3 + 4\ H^+ + 2\ e \rightleftharpoons 2\ FeOH^+ + H_2O$	0.16
$Co(OH)_3 + e \rightleftharpoons Co(OH)_2 + OH^-$	0.17
$SO_4^{2-} + 4\ H^+ + 2\ e \rightleftharpoons H_2SO_3 + H_2O$	0.172
$Bi^{3+} + 2\ e \rightleftharpoons Bi^+$	0.2
$[Ru(en)_3]^{3+} + e \rightleftharpoons [Ru(en)_3]^{2+}$	0.210
$SbO^+ + 2\ H^+ + 3\ e \rightleftharpoons Sb + 2\ H_2O$	0.212
$AgCl + e \rightleftharpoons Ag + Cl^-$	0.22233
$[Ru(H_2O)_6]^{3+} + e \rightleftharpoons [Ru(H_2O)_6]^{2+}$	0.23
$As_2O_3 + 6\ H^+ + 6\ e \rightleftharpoons 2\ As + 3\ H_2O$	0.234
Calomel electrode, saturated NaCl (SSCE)	0.2360
$Ge^{2+} + 2\ e \rightleftharpoons Ge$	0.24
$Ru^{3+} + e \rightleftharpoons Ru^{2+}$	0.24
Calomel electrode, saturated KCl	0.2412
$PbO_2 + H_2O + 2\ e \rightleftharpoons PbO + 2\ OH^-$	0.247
$HAsO_2 + 3\ H^+ + 3\ e \rightleftharpoons As + 2\ H_2O$	0.248
$Ru^{3+} + e \rightleftharpoons Ru^{2+}$	0.2487

TABLE 2
Reduction Reactions Having E° Values More Positive than that of the Standard Hydrogen Electrode (continued)

Reaction	E°/V
$ReO_2 + 4\,H^+ + 4\,e \rightleftharpoons Re + 2\,H_2O$	0.2513
$IO_3^- + 3\,H_2O + 6\,e \rightleftharpoons I^- + OH^-$	0.26
$Hg_2Cl_2 + 2\,e \rightleftharpoons 2\,Hg + 2\,Cl^-$	0.26808
Calomel electrode, 1 molal KCl	0.2800
Calomel electrode, 1 molar KCl (NCE)	0.2801
$At_2 + 2\,e \rightleftharpoons 2\,At^-$	0.3
$Re^{3+} + 3\,e \rightleftharpoons Re$	0.300
$Tc^{3+} + e \rightleftharpoons Tc^{2+}$	0.3
$Bi^{3+} + 3\,e \rightleftharpoons Bi$	0.308
$BiO^+ + 2\,H^+ + 3\,e \rightleftharpoons Bi + H_2O$	0.320
$UO_2^{2+} + 4\,H^+ + 2\,e \rightleftharpoons U^{4+} + 2\,H_2O$	0.327
$ClO_3^- + H_2O + 2\,e \rightleftharpoons ClO_2^- + 2\,OH^-$	0.33
$2\,HCNO + 2\,H^+ + 2\,e \rightleftharpoons (CN)_2 + 2\,H_2O$	0.330
Calomel electrode, 0.1 molar KCl	0.3337
$VO^{2+} + 2\,H^+ + e \rightleftharpoons V^{3+} + H_2O$	0.337
$Cu^{2+} + 2\,e \rightleftharpoons Cu$	0.3419
$Ag_2O + H_2O + 2\,e \rightleftharpoons 2\,Ag + 2\,OH^-$	0.342
$Cu^{2+} + 2\,e \rightleftharpoons Cu(Hg)$	0.345
$AgIO_3 + e \rightleftharpoons Ag + IO_3^-$	0.354
$[Fe(CN)_6]^{3-} + e \rightleftharpoons [Fe(CN)_6]^{4-}$	0.358
$ClO_4^- + H_2O + 2\,e \rightleftharpoons ClO^-_3 + 2\,OH^-$	0.36
$Ag_2SeO_3 + 2\,e \rightleftharpoons 2\,Ag + SeO_3^{2-}$	0.3629
$ReO_4^- + 8\,H^+ + 7\,e \rightleftharpoons Re + 4\,H_2O$	0.368
$(CN)_2 + 2\,H^+ + 2\,e \rightleftharpoons 2\,HCN$	0.373
[Ferricinium]$^+ + e \rightleftharpoons$ ferrocene	0.400
$Tc^{2+} + 2\,e \rightleftharpoons Tc$	0.400
$O_2 + 2\,H_2O + 4\,e \rightleftharpoons 4\,OH^-$	0.401
$AgOCN + e \rightleftharpoons Ag + OCN^-$	0.41
$[RhCl_6]^{3-} + 3\,e \rightleftharpoons Rh + 6\,Cl^-$	0.431
$Ag_2CrO_4 + 2\,e \rightleftharpoons 2\,Ag + CrO_4^{2-}$	0.4470
$H_2SO_3 + 4\,H^+ + 4\,e \rightleftharpoons S + 3\,H_2O$	0.449
$Ru^{2+} + 2\,e \rightleftharpoons Ru$	0.455
$Ag_2MoO_4 + 2\,e \rightleftharpoons 2\,Ag + MoO_4^{2-}$	0.4573
$Ag_2C_2O_4 + 2\,e \rightleftharpoons 2\,Ag + C_2O_4^{2-}$	0.4647
$Ag_2WO_4 + 2\,e \rightleftharpoons 2\,Ag + WO_4^{2-}$	0.4660
$Ag_2CO_3 + 2\,e \rightleftharpoons 2\,Ag + CO_3^{2-}$	0.47
$TcO_4^- + 8\,H^+ + 7\,e \rightleftharpoons Tc + 4\,H_2O$	0.472
$TeO_4^- + 8\,H^+ + 7\,e \rightleftharpoons Te + 4\,H_2O$	0.472
$IO^- + H_2O + 2\,e \rightleftharpoons I^- + 2\,OH^-$	0.485
$NiO_2 + 2\,H_2O + 2\,e \rightleftharpoons Ni(OH)_2 + 2\,OH^-$	0.490
$Bi^+ + e \rightleftharpoons Bi$	0.5
$ReO_4^- + 4\,H^+ + 3\,e \rightleftharpoons ReO_2 + 2\,H_2O$	0.510
$Hg_2(ac)_2 + 2\,e \rightleftharpoons 2\,Hg + 2(ac)^-$	0.51163
$Cu^+ + e \rightleftharpoons Cu$	0.521
$I_2 + 2\,e \rightleftharpoons 2\,I^-$	0.5355
$I_3^- + 2\,e \rightleftharpoons 3\,I^-$	0.536
$AgBrO_3 + e \rightleftharpoons Ag + BrO_3^-$	0.546
$MnO_4^- + e \rightleftharpoons MnO_4^-$	0.558
$H_3AsO_4 + 2\,H^+ + 2\,e \rightleftharpoons HAsO_2 + 2\,H_2O$	0.560
$S_2O_6^{2-} + 4\,H^+ + 2\,e \rightleftharpoons 2\,H_2SO_3$	0.564
$AgNO_2 + e \rightleftharpoons Ag + NO_2^-$	0.564
$Te^{4+} + 4\,e \rightleftharpoons Te$	0.568
$Sb_2O_5 + 6\,H^+ + 4\,e \rightleftharpoons 2\,SbO^+ + 3\,H_2O$	0.581
$RuO_4^- + e \rightleftharpoons RuO_4^{2-}$	0.59
$[PdCl_4]^{2-} + 2\,e \rightleftharpoons Pd + 4\,Cl^-$	0.591
$TeO_2 + 4\,H^+ + 4\,e \rightleftharpoons Te + 2\,H_2O$	0.593
$MnO_4^- + 2\,H_2O + 3\,e \rightleftharpoons MnO_2 + 4\,OH^-$	0.595
$Rh^{2+} + 2\,e \rightleftharpoons Rh$	0.600
$Rh^+ + e \rightleftharpoons Rh$	0.600
$MnO_4^{2-} + 2\,H_2O + 2\,e \rightleftharpoons MnO_2 + 4\,OH^-$	0.60
$2\,AgO + H_2O + 2\,e \rightleftharpoons Ag_2O + 2\,OH^-$	0.607
$BrO_3^- + 3\,H_2O + 6\,e \rightleftharpoons Br^- + 6\,OH^-$	0.61
$UO_2^+ + 4\,H^+ + e \rightleftharpoons U^{4+} + 2\,H_2O$	0.612
$Hg_2SO_4 + 2\,e \rightleftharpoons 2\,Hg + SO_4^{2-}$	0.6125
$ClO_3^- + 3\,H_2O + 6\,e \rightleftharpoons Cl^- + 6\,OH^-$	0.62
$Hg_2HPO_4 + 2\,e \rightleftharpoons 2\,Hg + HPO_4^{2-}$	0.6359
$Ag(ac) + e \rightleftharpoons Ag + (ac)^-$	0.643
Sb_2O_5(valentinite) $+ 4\,H^+ + 4\,e \rightleftharpoons Sb_2O_3 + 2\,H_2O$	0.649
$Ag_2SO_4 + 2\,e \rightleftharpoons 2\,Ag + SO_4^{2-}$	0.654
$ClO_2^- + H_2O + 2\,e \rightleftharpoons ClO^- + 2\,OH^-$	0.66
Sb_2O_5(senarmontite) $+ 4\,H^+ + 4\,e \rightleftharpoons Sb_2O_5 + 2\,H_2O$	0.671
$[PtCl_6]^{2-} + 2\,e \rightleftharpoons [PtCl_4]^{2-} + 2\,Cl^-$	0.68
$O_2 + 2\,H^+ + 2\,e \rightleftharpoons H_2O_2$	0.695
p–benzoquinone $+ 2\,H^+ + 2\,e \rightleftharpoons$ hydroquinone	0.6992
$H_3IO_6^{2-} + 2\,e \rightleftharpoons IO_3^- + 3\,OH^-$	0.7
$Ag_2O_3 + H_2O + 2\,e \rightleftharpoons 2\,AgO + 2\,OH^-$	0.739
$Tl^{3+} + 3\,e \rightleftharpoons Tl$	0.741
$[PtCl_4]^{2-} + 2\,e \rightleftharpoons Pt + 4\,Cl^-$	0.755
$Rh^{3+} + 3\,e \rightleftharpoons Rh$	0.758
$ClO_2^- + 2\,H_2O + 4\,e \rightleftharpoons Cl^- + 4\,OH^-$	0.76
$2\,NO + H_2O + 2\,e \rightleftharpoons N_2O + 2\,OH^-$	0.76
$Po^{4+} + 4\,e \rightleftharpoons Po$	0.76
$BrO^- + H_2O + 2\,e \rightleftharpoons Br^- + 2\,OH^-$	0.761
$ReO_4^- + 2\,H^+ + e \rightleftharpoons ReO_3 + H_2O$	0.768
$(CNS)_2 + 2\,e \rightleftharpoons 2\,CNS^-$	0.77
$[IrCl_6]^{3-} + 3\,e \rightleftharpoons Ir + 6\,Cl^-$	0.77
$Fe^{3+} + e \rightleftharpoons Fe^{2+}$	0.771
$AgF + e \rightleftharpoons Ag + F^-$	0.779
$[Fe(bipy)_2]^{3+} + e \rightleftharpoons [Fe(bipy)_2]^{2+}$	0.78
$TcO_4^- + 4\,H^+ + 3\,e \rightleftharpoons TcO_2 + 2\,H_2O$	0.782
$Hg_2^{2+} + 2\,e \rightleftharpoons 2\,Hg$	0.7973
$Ag^+ + e \rightleftharpoons Ag$	0.7996
$[Os(bipy)_3]^{3+} + e \rightleftharpoons [Os(bipy)_3]^{2+}$	0.80
$2\,NO_3^- + 4\,H^+ + 2\,e \rightleftharpoons N_2O_4 + 2\,H_2O$	0.803
$[Os(bipy)_2]^{3+} + e \rightleftharpoons [Os(bipy)_2]^{2+}$	0.81
$RhOH^{2+} + H + 3\,e \rightleftharpoons Rh + H_2O$	0.83
$OsO_4 + 8\,H^+ + 8\,e \rightleftharpoons Os + 4\,H_2O$	0.838
$ClO^- + H_2O + 2\,e \rightleftharpoons Cl^- + 2\,OH^-$	0.841
$Hg^{2+} + 2\,e \rightleftharpoons Hg$	0.851
$AuBr_4^- + 3\,e \rightleftharpoons Au + 4\,Br^-$	0.854
SiO_2(quartz) $+ 4\,H^+ + 4\,e \rightleftharpoons Si + 2\,H_2O$	0.857
$2\,HNO_2 + 4\,H^+ + 4\,e \rightleftharpoons H_2N_2O_2 + H_2O$	0.86
$[Ru(CN)_6]^{3-} + e^- \rightleftharpoons [Ru(CN)_6]^{4-}$	0.86
$[IrCl_6]^{2-} + e \rightleftharpoons [IrCl_6]^{3-}$	0.8665
$N_2O_4 + 2\,e \rightleftharpoons 2\,NO_2^-$	0.867
$HO_2^- + H_2O + 2\,e \rightleftharpoons 3\,OH^-$	0.878
$Po^{4+} + 2\,e \rightleftharpoons Po^{2+}$	0.9
$2\,Hg^{2+} + 2\,e \rightleftharpoons Hg_2^{2+}$	0.920

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TABLE 2
Reduction Reactions Having E° Values More Positive than that of the Standard Hydrogen Electrode (continued)

Reaction	E°/V
$NO_3^- + 3\ H^+ + 2\ e \rightleftharpoons HNO_2 + H_2O$	0.934
$Pd^{2+} + 2\ e \rightleftharpoons Pd$	0.951
$ClO_2(aq) + e \rightleftharpoons ClO_2^-$	0.954
$NO_3^- + 4\ H^+ + 3\ e \rightleftharpoons NO + 2\ H_2O$	0.957
$V_2O_5 + 6\ H^+ + 2\ e \rightleftharpoons 2\ VO^{2+} + 3\ H_2O$	0.957
$AuBr_2^- + e \rightleftharpoons Au + 2\ Br^-$	0.959
$HNO_2 + H^+ + e \rightleftharpoons NO + H_2O$	0.983
$HIO + H^+ + 2\ e \rightleftharpoons I^- + H_2O$	0.987
$VO_2^+ + 2\ H^+ + e \rightleftharpoons VO^{2+} + H_2O$	0.991
$PtO_2 + 4\ H^+ + 4\ e \rightleftharpoons Pt + 2\ H_2O$	1.00
$RuO_4 + e \rightleftharpoons RuO_4^-$	1.00
$V(OH)_4^+ + 2\ H^+ + e \rightleftharpoons VO^{2+} + 3\ H_2O$	1.00
$AuCl_4^- + 3\ e \rightleftharpoons Au + 4\ Cl^-$	1.002
$Pu^{4+} + e \rightleftharpoons Pu^{3+}$	1.006
$PtO_2 + 2\ H^+ + 2\ e \rightleftharpoons PtO + H_2O$	1.01
$OsO_4 + 4\ H + 4\ e \rightleftharpoons OsO_2 + 2\ H_2O$	1.02
$H_6TeO_6 + 2\ H^+ + 2\ e \rightleftharpoons TeO_2 + 4\ H_2O$	1.02
$[Fe(bipy)_3]^{3+} + e \rightleftharpoons [Fe(bipy)_3]^{2+}$	1.03
$Hg(OH)_2 + 2\ H^+ + 2\ e \rightleftharpoons Hg + 2\ H_2O$	1.034
$N_2O_4 + 4\ H^+ + 4\ e \rightleftharpoons 2\ NO + 2\ H_2O$	1.035
$RuO_4 + 8\ H^+ + 8\ e \rightleftharpoons Ru + 4H_2O$	1.038
$[Fe(phen)_3]^{3+} + e \rightleftharpoons [Fe(phen)_3]^{2+}$ (1 molar H_2SO_4)	1.06
$PuO_2(OH)_2 + H^+ + e \rightleftharpoons PuO_2OH + H_2O$	1.062
$N_2O_4 + 2\ H^+ + 2\ e \rightleftharpoons 2\ HNO_2$	1.065
$Br_2(l) + 2\ e \rightleftharpoons 2Br^-$	1.066
$IO_3^- + 6\ H^+ + 6\ e \rightleftharpoons I^- + 3\ H_2O$	1.085
$Br_2(aq) + 2\ e \rightleftharpoons 2Br^-$	1.0873
$Pu^{5+} + e \rightleftharpoons Pu^{4+}$	1.099
$Cu^{2+} + 2\ CN^- + e \rightleftharpoons [Cu(CN)_2]^-$	1.103
$RuO_2 + 4\ H^+ + 2\ e \rightleftharpoons Ru^{2+} + 2\ H_2O$	1.120
$[Fe(phen)_3]^{3+} + e \rightleftharpoons [Fe(phen)_3]^{2+}$	1.147
$SeO_4^{2-} + 4\ H^+ + 2\ e \rightleftharpoons H_2SeO_3 + H_2O$	1.151
$ClO_3^- + 2\ H^+ + e \rightleftharpoons ClO_2 + H_2O$	1.152
$Ir^{3+} + 3\ e \rightleftharpoons Ir$	1.156
$Pt^{2+} + 2\ e \rightleftharpoons Pt$	1.18
$ClO_4^- + 2\ H^+ + 2\ e \rightleftharpoons ClO_3^- + H_2O$	1.189
$2\ IO_3^- + 12\ H^+ + 10\ e \rightleftharpoons I_2 + 6\ H_2O$	1.195
$PtOH^+ + H^+ + 2\ e \rightleftharpoons Pt + H_2O$	1.2
$ClO_3^- + 3\ H^+ + 2\ e \rightleftharpoons HClO_2 + H_2O$	1.214
$MnO_2 + 4\ H^+ + 2\ e \rightleftharpoons Mn^{2+} + 2\ H_2O$	1.224
$O_2 + 4\ H^+ + 4\ e \rightleftharpoons 2\ H_2O$	1.229
$Cr_2O_7^{2-} + 14\ H^+ + 6\ e \rightleftharpoons 2\ Cr^{3+} + 7\ H_2O$	1.232
$O_3 + H_2O + 2\ e \rightleftharpoons O_2 + 2\ OH^-$	1.24
$[Ru(bipy)_3]^{3+} + e \rightleftharpoons [Ru(bipy)_3]^{2+}$	1.24
$Tl^{3+} + 2\ e \rightleftharpoons Tl^+$	1.252
$N_2H_5^+ + 3\ H^+ + 2\ e \rightleftharpoons 2\ NH_4^+$	1.275
$ClO_2 + H^+ + e \rightleftharpoons HClO_2$	1.277
$[PdCl_6]^{2-} + 2\ e \rightleftharpoons [PdCl_4]^{2-} + 2\ Cl^-$	1.288
$2\ HNO_2 + 4\ H^+ + 4\ e \rightleftharpoons N_2O + 3\ H_2O$	1.297
$AuOH^{2+} + H^+ + 2\ e \rightleftharpoons Au^+ + H_2O$	1.32
$PuO_2(OH)_2 + 2\ H^- + 2\ e \rightleftharpoons Pu(OH)_4$	1.325
$HBrO + H^+ + 2\ e \rightleftharpoons Br^- + H_2O$	1.331
$Cr(V) + e \rightleftharpoons Cr(IV)$	1.34
$HCrO_4^- + 7\ H^+ + 3\ e \rightleftharpoons Cr^{3+} + 4\ H_2O$	1.350
$Cl_2(g) + 2\ e \rightleftharpoons 2Cl^-$	1.35827
$ClO_4^- + 8\ H^+ + 8\ e \rightleftharpoons Cl^- + 4\ H_2O$	1.389
$ClO_4^- + 8\ H^+ + 7\ e \rightleftharpoons 1/2\ Cl_2 + 4\ H_2O$	1.39
$No^{3+} + e \rightleftharpoons No^{2+}$	1.4
$RuO_4 + 6\ H^+ + 4\ e \rightleftharpoons Ru(OH)_2^{2+} + 2\ H_2O$	1.40
$Au^{3+} + 2\ e \rightleftharpoons Au^+$	1.401
$2\ NH_3OH^+ + H^+ + 2\ e \rightleftharpoons N_2H_5^+ + 2\ H_2O$	1.42
$BrO_3^- + 6\ H^+ + 6\ e \rightleftharpoons Br^- + 3\ H_2O$	1.423
$2\ HIO + 2\ H^+ + 2\ e \rightleftharpoons I_2 + 2\ H_2O$	1.439
$Au(OH)_3 + 3\ H^+ + 3\ e \rightleftharpoons Au^- + 3\ H_2O$	1.45
$3IO_3^- + 6\ H^+ + 6\ e \rightleftharpoons Cl^- + 3\ H_2O$	1.451
$PbO_2 + 4\ H^+ + 2\ e \rightleftharpoons Pb^{2+} + 2\ H_2O$	1.455
$ClO_3^- + 6\ H^+ + 5\ e \rightleftharpoons 1/2\ Cl_2 + 3\ H_2O$	1.47
$CrO_2 + 4\ H^+ + e \rightleftharpoons Cr^{3+} + 2\ H_2O$	1.48
$BrO_3^- + 6\ H^+ + 5\ e \rightleftharpoons 1/2\ Br_2 + 3\ H_2O$	1.482
$HClO + H^+ + 2\ e \rightleftharpoons Cl^- + H_2O$	1.482
$Mn_2O_3 + 6\ H^+ + e \rightleftharpoons 2\ Mn^{2+} + 3\ H_2O$	1.485
$HO_2 + H^+ + e \rightleftharpoons H_2O_2$	1.495
$Au^{3+} + 3\ e \rightleftharpoons Au$	1.498
$PtO_3 + 4\ H^+ + 2\ e \rightleftharpoons Pt(OH)_2^{2+} + H_2O$	1.5
$MnO_4^- + 8\ H^+ + 5\ e \rightleftharpoons Mn^{2+} + 4\ H_2O$	1.507
$Mn^{3+} + e \rightleftharpoons Mn^{2-}$	1.5415
$HClO_2 + 3\ H^+ + 4\ e \rightleftharpoons Cl^- + 2\ H_2O$	1.570
$HBrO + H^+ + e \rightleftharpoons 1/2\ Br_2(aq) + H_2O$	1.574
$2\ NO + 2\ H^+ + 2\ e \rightleftharpoons N_2O + H_2O$	1.591
$Bi_2O_4 + 4\ H^+ + 2\ e \rightleftharpoons 2\ BiO^+ + 2\ H_2O$	1.593
$HBrO + H^+ + e \rightleftharpoons 1/2\ Br_2(l) + H_2O$	1.596
$H_5IO_6 + H^+ + 2\ e \rightleftharpoons IO_3^- + 3\ H_2O$	1.601
$HClO + H^+ + e \rightleftharpoons 1/2\ Cl_2 + H_2O$	1.611
$HClO_2 + 3\ H^+ + 3\ e \rightleftharpoons 1/2\ Cl_2 + 2\ H_2O$	1.628
$HClO_2 + 2\ H^+ + 2\ e \rightleftharpoons HClO + H_2O$	1.645
$Bk^{4+} + e \rightleftharpoons Bk^{3+}$	1.67
$NiO_2 + 4\ H^+ + 2\ e \rightleftharpoons Ni^{2+} + 2\ H_2O$	1.678
$MnO_4^- + 4\ H^+ + 3\ e \rightleftharpoons MnO_2 + 2\ H_2O$	1.679
$PbO_2 + SO_4^{2-} + 4\ H^+ + 2\ e \rightleftharpoons PbSO_4 + 2\ H_2O$	1.6913
$Au^+ + e \rightleftharpoons Au$	1.692
$PtO_3 + 2\ H^+ + 2\ e \rightleftharpoons PtO_2 + H_2O$	1.7
$CeOH^{3+} + H^+ + e \rightleftharpoons Ce^{3+} + H_2O$	1.715
$Ce^{4+} + e \rightleftharpoons Ce^{3+}$	1.72
$N_2O + 2\ H^+ + 2\ e \rightleftharpoons N_2 + H_2O$	1.766
$H_2O_2 + 2\ H^+ + 2\ e \rightleftharpoons 2\ H_2O$	1.776
$Ag^{3+} + e \rightleftharpoons Ag^{2+}$	1.8
$Au^{2+} + e^- \rightleftharpoons Au^+$	1.8
$Ag_2O_2 + 4\ H^+ + e \rightleftharpoons 2\ Ag + 2\ H_2O$	1.802
$Co^{3+} + e \rightleftharpoons Co^{2-}$(2 molar H_2SO_4)	1.83
$Ag^{3+} + 2\ e \rightleftharpoons Ag^+$	1.9
$Co^{3+} + e \rightleftharpoons Co^{2+}$	1.92
$Ag^{2+} + e \rightleftharpoons Ag^+$	1.980
$Cu_2O_3 + 6\ H^+ + 2\ e \rightleftharpoons 2\ Cu^{2+} + 3\ H_2O$	2.0
$S_2O_8^{2-} + 2\ e \rightleftharpoons 2\ SO_4^{2-}$	2.010
$OH + e \rightleftharpoons OH^-$	2.02
$HFeO_4^- + 7\ H^+ + 3\ e \rightleftharpoons Fe^{3+} + 4\ H_2O$	2.07
$O_3 + 2\ H^+ + 2\ e \rightleftharpoons O_2 + H_2O$	2.076
$HFeO_4^- + 4\ H^+ + 3\ e \rightleftharpoons FeOOH + 2\ H_2O$	2.08

TABLE 2
Reduction Reactions Having E° Values More Positive than that of the Standard Hydrogen Electrode (continued)

Reaction	E°/V	Reaction	E°/V
$2\ HFeO_4^- + 8\ H^+ + 6\ e \rightleftharpoons Fe_2O_3 + 5\ H_2O$	2.09	$H_2N_2O_2 + 2\ H^+ + 2\ e \rightleftharpoons N_2 + 2\ H_2O$	2.65
$XeO_3 + 6\ H^+ + 6\ e \rightleftharpoons Xe + 3\ H_2O$	2.10	$F_2 + 2\ e \rightleftharpoons 2\ F^-$	2.866
$S_2O_8^{2-} + 2\ H^+ + 2\ e \rightleftharpoons 2\ HSO_4^-$	2.123	$Cm^{4+} + e \rightleftharpoons Cm^{3+}$	3.0
$F_2O + 2\ H^+ + 4\ e \rightleftharpoons H_2O + 2\ F^-$	2.153	$F_2 + 2\ H^+ + 2\ e \rightleftharpoons 2\ HF$	3.053
$FeO_4^{2-} + 8\ H^+ + 3\ e \rightleftharpoons Fe^{3+} + 4\ H_2O$	2.20	$Tb^{4+} + e \rightleftharpoons Tb^{3+}$	3.1
$Cu^{3+} + e \rightleftharpoons Cu^{2+}$	2.4	$Pr^{4+} + e \rightleftharpoons Pr^{3+}$	3.2
$H_4XeO_6 + 2\ H^+ + 2\ e \rightleftharpoons XeO_3 + 3\ H_2O$	2.42	$Cf^{4+} + e \rightleftharpoons Cf^{3+}$	3.3
$O(g) + 2\ H^+ + 2\ e \rightleftharpoons H_2O$	2.421	$XeF + e \rightleftharpoons Xe + F^-$	3.4
$Am^{4+} + e \rightleftharpoons Am^{3+}$	2.60		

TABLE 3
Reduction Reactions Having E° Values More Negative than that of the Standard Hydrogen Electrode

Reaction	E°/V	Reaction	E°/V
$2\ H^+ + 2\ e \rightleftharpoons H_2$	0.00000	$Cu(OH)_2 + 2\ e \rightleftharpoons Cu + 2\ OH^-$	–0.222
$2\ D^+ + 2\ e \rightleftharpoons D_2$	–0.013	$V_2O_5 + 10\ H^+ + 10\ e \rightleftharpoons 2\ V + 5\ H_2O$	–0.242
$AgCN + e \rightleftharpoons Ag + CN^-$	–0.017	$CdSO_4 + 2\ e \rightleftharpoons Cd + SO_4^{2-}$	–0.246
$2\ WO_3 + 2\ H^+ + 2\ e \rightleftharpoons W_2O_5 + H_2O$	–0.029	$V(OH)_4^+ + 4\ H^+ + 5\ e \rightleftharpoons V + 4\ H_2O$	–0.254
$W_2O_5 + 2\ H^+ + 2\ e \rightleftharpoons 2\ WO_2 + H_2O$	–0.031	$V^{3+} + e \rightleftharpoons V^{2+}$	–0.255
$Ag_2S + 2\ H^+ + 2\ e \rightleftharpoons 2\ Ag + H_2S$	–0.0366	$Ni^{2+} + 2\ e \rightleftharpoons Ni$	–0.257
$Fe^{3+} + 3\ e \rightleftharpoons Fe$	–0.037	$PbCl_2 + 2\ e \rightleftharpoons Pb + 2\ Cl^-$	–0.2675
$Hg_2I_2 + 2\ e \rightleftharpoons 2\ Hg + 2\ I^-$	–0.0405	$H_3PO_4 + 2\ H^+ + 2\ e \rightleftharpoons H_3PO_3 + H_2O$	–0.276
$Tl(OH)_3 + 2\ e \rightleftharpoons TlOH + 2\ OH^-$	–0.05	$Co^{2+} + 2\ e \rightleftharpoons Co$	–0.28
$TiOH^{3+} + H^+ + e \rightleftharpoons Ti^{3+} + H_2O$	–0.055	$PbBr_2 + 2\ e \rightleftharpoons Pb + 2\ Br^-$	–0.284
$2\ H_2SO_3 + H^+ + 2\ e \rightleftharpoons HS_2O_4^- + 2\ H_2O$	–0.056	$Tl^+ + e \rightleftharpoons Tl(Hg)$	–0.3338
$P(white) + 3\ H^+ + 3\ e \rightleftharpoons PH_3(g)$	–0.063	$Tl^+ + e \rightleftharpoons Tl$	–0.336
$O_2 + H_2O + 2\ e \rightleftharpoons HO_2^- + OH^-$	–0.076	$In^{3+} + 3\ e \rightleftharpoons In$	–0.3382
$2\ Cu(OH)_2 + 2\ e \rightleftharpoons Cu_2O + 2\ OH^- + H_2O$	–0.080	$TlOH + e \rightleftharpoons Tl + OH^-$	–0.34
$Se + 2\ H^+ + 2\ e \rightleftharpoons H_2Se$	–0.082	$PbF_2 + 2\ e \rightleftharpoons Pb + 2\ F^-$	–0.3444
$WO_3 + 6\ H^+ + 6\ e \rightleftharpoons W + 3\ H_2O$	–0.090	$PbSO_4 + 2\ e \rightleftharpoons Pb(Hg) + SO_4^{2-}$	–0.3505
$SnO_2 + 4\ H^+ + 2\ e \rightleftharpoons Sn^{2+} + 2\ H_2O$	–0.094	$Cd^{2+} + 2\ e \rightleftharpoons Cd(Hg)$	–0.3521
$Md^{3+} + e \rightleftharpoons Md^{2+}$	–0.1	$PbSO_4 + 2\ e \rightleftharpoons Pb + SO_4^{2-}$	–0.3588
$P(red) + 3\ H^+ + 3\ e \rightleftharpoons PH_3(g)$	–0.111	$Cu_2O + H_2O + 2\ e \rightleftharpoons 2\ Cu + 2\ OH^-$	–0.360
$SnO_2 + 4\ H^+ + 4\ e \rightleftharpoons Sn + 2\ H_2O$	–0.117	$Eu^{3+} + e \rightleftharpoons Eu^{2+}$	–0.36
$GeO_2 + 2\ H^+ + 2\ e \rightleftharpoons GeO + H_2O$	–0.118	$PbI_2 + 2\ e \rightleftharpoons Pb + 2\ I^-$	–0.365
$WO_2 + 4\ H^+ + 4\ e \rightleftharpoons W + 2\ H_2O$	–0.119	$SeO_3^{2-} + 3\ H_2O + 4\ e \rightleftharpoons Se + 6\ OH^-$	–0.366
$Pb^{2+} + 2\ e \rightleftharpoons Pb(Hg)$	–0.1205	$Se + 2\ H^+ + 2\ e \rightleftharpoons H_2Se(aq)$	–0.399
$Pb^{2+} + 2\ e \rightleftharpoons Pb$	–0.1262	$In^{2+} + e \rightleftharpoons In^+$	–0.40
$CrO_4^{2-} + 4\ H_2O + 3\ e \rightleftharpoons Cr(OH)_3 + 5\ OH^-$	–0.13	$Cd^{2+} + 2\ e \rightleftharpoons Cd$	–0.4030
$Sn^{2-} + 2\ e \rightleftharpoons Sn$	–0.1375	$Cr^{3+} + e \rightleftharpoons Cr^{2+}$	–0.407
$In^+ + e \rightleftharpoons In$	–0.14	$2\ S + 2\ e \rightleftharpoons S_2^{2-}$	–0.42836
$O_2 + 2\ H_2O + 2\ e \rightleftharpoons H_2O_2 + 2\ OH^-$	–0.146	$Tl_2SO_4 + 2\ e \rightleftharpoons Tl + SO_4^{2-}$	–0.4360
$MoO_2 + 4\ H^+ + 4\ e \rightleftharpoons Mo + 4\ H_2O$	–0.152	$In^{3+} + 2\ e \rightleftharpoons In^+$	–0.443
$AgI + e \rightleftharpoons Ag + I^-$	–0.15224	$Fe^{2+} + 2\ e \rightleftharpoons Fe$	–0.447
$2\ NO_2^- + 2\ H_2O + 4\ e \rightleftharpoons N_2O_2^{2-} + 4\ OH^-$	–0.18	$H_3PO_3 + 3\ H^+ + 3\ e \rightleftharpoons P + 3\ H_2O$	–0.454
$H_2GeO_3 + 4\ H^+ + 4\ e \rightleftharpoons Ge + 3\ H_2O$	–0.182	$Bi_2O_3 + 3\ H_2O + 6\ e \rightleftharpoons 2\ Bi + 6\ OH^-$	–0.46
$SnO_2 + 3\ H^+ + 2\ e \rightleftharpoons SnOH^+ + H_2O$	–0.194	$NO_2^- + H_2O + e \rightleftharpoons NO + 2\ OH$	–0.46
$CO_2 + 2\ H^+ + 2\ e \rightleftharpoons HCOOH$	–0.199	$PbHPO_4 + 2\ e \rightleftharpoons Pb + HPO_4^{2-}$	–0.465
$Mo^{3+} + 3\ e \rightleftharpoons Mo$	–0.200	$S + 2\ e \rightleftharpoons S^{2-}$	–0.47627
$Ga^+ + e \rightleftharpoons Ga$	–0.2	$S + H_2O + 2\ e \rightleftharpoons HS^- + OH^-$	–0.478
$2\ SO_2^{2-} + 4\ H^+ + 2\ e \rightleftharpoons S_2O_6^{2-} + H_2O$	–0.22	$B(OH)_3 + 7\ H^+ + 8\ e \rightleftharpoons BH_4^- + 3\ H_2O$	–0.481

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TABLE 3
Reduction Reactions Having E° Values More Negative than that of the Standard Hydrogen Electrode (continued)

Reaction	E°/V
$In^{3+} + e \rightleftharpoons In^{2+}$	–0.49
$ZnOH^+ + H^+ + 2\,e \rightleftharpoons Zn + H_2O$	–0.497
$GaOH^{2+} + H^+ + 3\,e \rightleftharpoons Ga + H_2O$	–0.498
$H_3PO_3 + 2\,H^+ + 2\,e \rightleftharpoons H_3PO_2 + H_2O$	–0.499
$TiO_2 + 4\,H^+ + 2\,e \rightleftharpoons Ti^{2+} + 2\,H_2O$	–0.502
$H_3PO_2 + H^+ + e \rightleftharpoons P + 2\,H_2O$	–0.508
$Sb + 3\,H^+ + 3\,e \rightleftharpoons SbH_3$	–0.510
$HPbO_2^- + H_2O + 2\,e \rightleftharpoons Pb + 3\,OH^-$	–0.537
$Ga^{3+} + 3\,e \rightleftharpoons Ga$	–0.549
$TlCl + e \rightleftharpoons Tl + Cl^-$	–0.5568
$Fe(OH)_3 + e \rightleftharpoons Fe(OH)_2 + OH^-$	–0.56
$TeO_3^{2-} + 3\,H_2O + 4\,e \rightleftharpoons Te + 6\,OH^-$	–0.57
$2\,SO_3^{2-} + 3\,H_2O + 4\,e \rightleftharpoons S_2O_3^{2-} + 6\,OH^-$	–0.571
$PbO + H_2O + 2\,e \rightleftharpoons Pb + 2\,OH^-$	–0.580
$ReO_2^- + 4\,H_2O + 7\,e \rightleftharpoons Re + 8\,OH^-$	–0.584
$SbO_3^- + H_2O + 2\,e \rightleftharpoons SbO_2^- + 2\,OH^-$	–0.59
$Ta^{3+} + 3\,e \rightleftharpoons Ta$	–0.6
$U^{4+} + e \rightleftharpoons U^{3+}$	–0.607
$As + 3\,H^+ + 3\,e \rightleftharpoons AsH_3$	–0.608
$Nb_2O_5 + 10\,H^+ + 10\,e \rightleftharpoons 2\,Nb + 5\,H_2O$	–0.644
$NbO_2 + 2\,H^+ + 2\,e \rightleftharpoons NbO + H_2O$	–0.646
$Cd(OH)_4^{2-} + 2\,e \rightleftharpoons Cd + 4\,OH^-$	–0.658
$TlBr + e \rightleftharpoons Tl + Br^-$	–0.658
$SbO_2^- + 2\,H_2O + 3\,e \rightleftharpoons Sb + 4\,OH^-$	–0.66
$AsO_2^- + 2\,H_2O + 3\,e \rightleftharpoons As + 4\,OH^-$	–0.68
$NbO_2 + 4\,H^+ + 4\,e \rightleftharpoons Nb + 2\,H_2O$	–0.690
$Ag_2S + 2\,e \rightleftharpoons 2\,Ag + S^{2-}$	–0.691
$AsO_4^{3-} + 2\,H_2O + 2\,e \rightleftharpoons AsO_2^- + 4\,OH^-$	–0.71
$Ni(OH)_2 + 2\,e \rightleftharpoons Ni + 2\,OH^-$	–0.72
$Co(OH)_2 + 2\,e \rightleftharpoons Co + 2\,OH^-$	–0.73
$NbO + 2\,H^+ + 2\,e \rightleftharpoons Nb + H_2O$	–0.733
$H_2SeO_3 + 4\,H^+ + 4\,e \rightleftharpoons Se + 3\,H_2O$	–0.74
$Cr^{3+} + 3\,e \rightleftharpoons Cr$	–0.744
$Ta_2O_5 + 10\,H^+ + 10\,e \rightleftharpoons 2\,Ta + 5\,H_2O$	–0.750
$TlI + e \rightleftharpoons Tl + I^-$	–0.752
$Zn^{2+} + 2\,e \rightleftharpoons Zn$	–0.7618
$Zn^{2+} + 2\,e \rightleftharpoons Zn(Hg)$	–0.7628
$CdO + H_2O + 2\,e \rightleftharpoons Cd + 2\,OH^-$	–0.783
$Te + 2\,H^+ + 2\,e \rightleftharpoons H_2Te$	–0.793
$ZnSO_4{\cdot}7H_2O + 2\,e \rightleftharpoons Zn(Hg) + SO_4^{2-} + 7\,H_2O$ (Saturated $ZnSO_4$)	–0.7993
$Bi + 3\,H^+ + 3\,e \rightleftharpoons BiH_3$	–0.8
$SiO + 2\,H^+ + 2\,e \rightleftharpoons Si + H_2O$	–0.8
$Cd(OH)_2 + 2\,e \rightleftharpoons Cd(Hg) + 2\,OH^-$	–0.809
$2\,H_2O + 2\,e \rightleftharpoons H_2 + 2\,OH^-$	–0.8277
$2\,NO_3^- + 2\,H_2O + 2\,e \rightleftharpoons N_2O_4 + 4\,OH^-$	–0.85
$H_3BO_3 + 3\,H^+ + 3\,e \rightleftharpoons B + 3\,H_2O$	–0.8698
$P + 3\,H_2O + 3\,e \rightleftharpoons PH_3(g) + 3\,OH^-$	–0.87
$Ti^{3+} + e \rightleftharpoons Ti^{2+}$	–0.9
$HSnO_2^- + H_2O + 2\,e \rightleftharpoons Sn + 3\,OH^-$	–0.909
$Cr^{2+} + 2\,e \rightleftharpoons Cr$	–0.913
$Se + 2\,e \rightleftharpoons Se^{2-}$	–0.924
$SO_4^{2-} + H_2O + 2\,e \rightleftharpoons SO_3^{2-} + 2\,OH^-$	–0.93
$Sn(OH)_6^{2-} + 2\,e \rightleftharpoons HSnO_2^- + 3\,OH^- + H_2O$	–0.93
$SnO_2 + 2\,H_2O + 4\,e \rightleftharpoons Sn + 4\,OH^-$	–0.945
$In(OH)_3 + 3\,e \rightleftharpoons In + 3\,OH^-$	–0.99
$NpO_2 + H_2O + H^+ + e \rightleftharpoons Np(OH)_3$	–0.962
$In(OH)_4^- + 3\,e \rightleftharpoons In + 4\,OH^-$	–1.007
$In_2O_3 + 3\,H_2O + 6\,e \rightleftharpoons 2\,In + 6\,OH^-$	–1.034
$PO_4^{3-} + 2\,H_2O + 2\,e \rightleftharpoons HPO_3^{2-} + 3\,OH^-$	–1.05
$Yb^{3+} + e \rightleftharpoons Yb^{2+}$	–1.05
$Nb^{3+} + 3\,e \rightleftharpoons Nb$	–1.099
$Fm^{3+} + e \rightleftharpoons Fm^{2+}$	–1.1
$2\,SO_3^{2-} + 2\,H_2O + 2\,e \rightleftharpoons S_2O_4^{2-} + 4\,OH^-$	–1.12
$Te + 2\,e \rightleftharpoons Te^{2-}$	–1.143
$V^{2+} + 2\,e \rightleftharpoons V$	–1.175
$Mn^{2+} + 2\,e \rightleftharpoons Mn$	–1.185
$Zn(OH)_4^{2-} + 2\,e \rightleftharpoons Zn + 4\,OH^-$	–1.199
$CrO_2 + 2\,H_2O + 3\,e \rightleftharpoons Cr + 4\,OH^-$	–1.2
$No^{3+} + 3\,e \rightleftharpoons No$	–1.20
$ZnO_2^- + 2\,H_2O + 2\,e \rightleftharpoons Zn + 4\,OH^-$	–1.215
$H_2GaO_3^- + H_2O + 3\,e \rightleftharpoons Ga + 4\,OH^-$	–1.219
$H_2BO_3^- + 5\,H_2O + 8\,e \rightleftharpoons BH_4^- + 8\,OH^-$	–1.24
$SiF_6^{2-} + 4\,e \rightleftharpoons Si + 6\,F^-$	–1.24
$Zn(OH)_2 + 2\,e \rightleftharpoons Zn + 2\,OH^-$	–1.249
$ZnO + H_2O + 2\,e \rightleftharpoons Zn + 2\,OH^-$	–1.260
$Es^{3+} + e \rightleftharpoons Es^{2+}$	–1.3
$Pa^{3+} + 3\,e \rightleftharpoons Pa$	–1.34
$Ti^{3+} + 3\,e \rightleftharpoons Ti$	–1.37
$Ce^{3+} + 3\,e \rightleftharpoons Ce(Hg)$	–1.4373
$UO_2^{2+} + 4\,H^+ + 6\,e \rightleftharpoons U + 2\,H_2O$	–1.444
$Zr^{4+} + 4\,e \rightleftharpoons Zr$	–1.45
$Cr(OH)_3 + 3\,e \rightleftharpoons Cr + 3\,OH^-$	–1.48
$Pa^{4+} + 4\,e \rightleftharpoons Pa$	–1.49
$HfO_2 + 4\,H^+ + 4\,e \rightleftharpoons Hf + 2\,H_2O$	–1.505
$Hf^{4+} + 4\,e \rightleftharpoons Hf$	–1.55
$Sm^{3+} + e \rightleftharpoons Sm^{2+}$	–1.55
$ZrO_2 + 4\,H^+ + 4\,e \rightleftharpoons Zr + 2\,H_2O$	–1.553
$Mn(OH)_2 + 2\,e \rightleftharpoons Mn + 2\,OH^-$	–1.56
$Ba^{2+} + 2\,e \rightleftharpoons Ba(Hg)$	–1.570
$Bk^{2+} + 2\,e \rightleftharpoons Bk$	–1.6
$Cf^{3+} + e \rightleftharpoons Cf^{2+}$	–1.6
$Ti^{2+} + 2\,e \rightleftharpoons Ti$	–1.630
$Md^{3+} + 3\,e \rightleftharpoons Md$	–1.65
$HPO_3^{2-} + 2\,H_2O + 2\,e \rightleftharpoons H_2PO_2^- + 3\,OH^-$	–1.65
$Al^{3+} + 3\,e \rightleftharpoons Al$	–1.662
$SiO_3^{2-} + H_2O + 4\,e \rightleftharpoons Si + 6\,OH^-$	–1.697
$HPO_3^{2-} + 2\,H_2O + 3\,e \rightleftharpoons P + 5\,OH^-$	–1.71
$HfO^{2+} + 2\,H^+ + 4\,e \rightleftharpoons Hf + H_2O$	–1.724
$ThO_2 + 4\,H^+ + 4\,e \rightleftharpoons Th + 2\,H_2O$	–1.789
$H_2BO_3^- + H_2O + 3\,e \rightleftharpoons B + 4\,OH^-$	–1.79
$Sr^{2+} + 2\,e \rightleftharpoons Sr(Hg)$	–1.793
$U^{3+} + 3\,e \rightleftharpoons U$	–1.798
$H_2PO^-_2 + e \rightleftharpoons P + 2\,OH^-$	–1.82
$Be^{2+} + 2\,e \rightleftharpoons Be$	–1.847
$Np^{3+} + 3\,e \rightleftharpoons Np$	–1.856
$Fm^{3+} + 3\,e \rightleftharpoons Fm$	–1.89
$Th^{4+} + 4\,e \rightleftharpoons Th$	–1.899

TABLE 3
Reduction Reactions Having E° Values More Negative than that of the Standard Hydrogen Electrode (continued)

Reaction	E°/V
$Am^{2+} + 2\,e \rightleftharpoons Am$	–1.9
$Pa^{4+} + e \rightleftharpoons Pa^{3+}$	–1.9
$Es^{3+} + 3\,e \rightleftharpoons Es$	–1.91
$Cf^{3+} + 3\,e \rightleftharpoons Cf$	–1.94
$Lr^{3+} + 3\,e \rightleftharpoons Lr$	–1.96
$Eu^{3+} + 3\,e \rightleftharpoons Eu$	–1.991
$Er^{2+} + 2\,e \rightleftharpoons Er$	–2.0
$Pr^{2+} + 2\,e \rightleftharpoons Pr$	–2.0
$Pu^{3+} + 3\,e \rightleftharpoons Pu$	–2.031
$Cm^{3+} + 3\,e \rightleftharpoons Cm$	–2.04
$Am^{3+} + 3\,e \rightleftharpoons Am$	–2.048
$AlF_6^{3-} + 3\,e \rightleftharpoons Al + 6\,F^-$	–2.069
$Sc^{3+} + 3\,e \rightleftharpoons Sc$	–2.077
$Ho^{2+} + 2\,e \rightleftharpoons Ho$	–2.1
$Nd^{2+} + 2\,e \rightleftharpoons Nd$	–2.1
$Cf^{2+} + 2\,e \rightleftharpoons Cf$	–2.12
$Yb^{3+} + 3\,e \rightleftharpoons Yb$	–2.19
$Ac^{3+} + 3\,e \rightleftharpoons Ac$	–2.20
$Dy^{2+} + 2\,e \rightleftharpoons Dy$	–2.2
$Tm^{3+} + e \rightleftharpoons Tm^{2+}$	–2.2
$Pm^{2+} + 2\,e \rightleftharpoons Pm$	–2.2
$Es^{2+} + 2\,e \rightleftharpoons Es$	–2.23
$H_2 + 2\,e \rightleftharpoons 2\,H^-$	–2.23
$Gd^{3+} + 3\,e \rightleftharpoons Gd$	–2.279
$Tb^{3+} + 3\,e \rightleftharpoons Tb$	–2.28
$Lu^{3+} + 3\,e \rightleftharpoons Lu$	–2.28
$Dy^{3+} + 3\,e \rightleftharpoons Dy$	–2.295
$Am^{3+} + e \rightleftharpoons Am^{2+}$	–2.3
$Fm^{2+} + 2\,e \rightleftharpoons Fm$	–2.30
$Pm^{3+} + 3\,e \rightleftharpoons Pm$	–2.30
$Sm^{3+} + 3\,e \rightleftharpoons Sm$	–2.304
$Al(OH)_3 + 3\,e \rightleftharpoons Al + 3\,OH^-$	–2.31
$Tm^{3+} + 3\,e \rightleftharpoons Tm$	–2.319
$Nd^{3+} + 3\,e \rightleftharpoons Nd$	–2.323
$Al(OH)^- + 3\,e \rightleftharpoons Al + 4\,OH^-$	–2.328
$H_2AlO_3^- + H_2O + 3\,e \rightleftharpoons Al + 4\,OH^-$	–2.33
$Ho^{3+} + 3\,e \rightleftharpoons Ho$	–2.33
$Er^{3+} + 3\,e \rightleftharpoons Er$	–2.331
$Ce^{3+} + 3\,e \rightleftharpoons Ce$	–2.336
$Pr^{3+} + 3\,e \rightleftharpoons Pr$	–2.353
$ZrO(OH)_2 + H_2O + 4\,e \rightleftharpoons Zr + 4\,OH^-$	–2.36
$Mg^{2+} + 2\,e \rightleftharpoons Mg$	–2.372
$Y^{3+} + 3\,e \rightleftharpoons Y$	–2.372
$La^{3+} + 3\,e \rightleftharpoons La$	–2.379
$Tm^{2+} + 2\,e \rightleftharpoons Tm$	–2.4
$Md^{2+} + 2\,e \rightleftharpoons Md$	–2.40
$Th(OH)_4 + 4\,e \rightleftharpoons Th + 4\,OH^-$	–2.48
$HfO(OH)_2 + H_2O + 4\,e \rightleftharpoons Hf + 4\,OH^-$	–2.50
$No^{2+} + 2\,e \rightleftharpoons No$	–2.50
$Dy^{3+} + e \rightleftharpoons Dy^{2+}$	–2.6
$Pm^{3+} + e \rightleftharpoons Pm^{2+}$	–2.6
$Be_2O_3^{2-} + 3\,H_2O + 4\,e \rightleftharpoons 2\,Be + 6\,OH^-$	–2.63
$Sm^{2+} + 2\,e \rightleftharpoons Sm$	–2.68
$Mg(OH)_2 + 2\,e \rightleftharpoons Mg + 2\,OH^-$	–2.690
$Nd^{3+} + e \rightleftharpoons Nd^{2+}$	–2.7
$Mg^+ + e \rightleftharpoons Mg$	–2.70
$Na^+ + e \rightleftharpoons Na$	–2.71
$Yb^{2+} + 2\,e \rightleftharpoons Yb$	–2.76
$Bk^{3+} + e \rightleftharpoons Bk^{2+}$	–2.8
$Ho^{3+} + e \rightleftharpoons Ho^{2+}$	–2.8
$Ra^{2+} + 2\,e \rightleftharpoons Ra$	–2.8
$Eu^{2+} + 2\,e \rightleftharpoons Eu$	–2.812
$Ca^{2+} + 2\,e \rightleftharpoons Ca$	–2.868
$Sr(OH)_2 + 2\,e \rightleftharpoons Sr + 2\,OH^-$	–2.88
$Sr^{2+} + 2\,e \rightleftharpoons Sr$	–2.899
$Fr^+ + e \rightleftharpoons Fr$	–2.9
$La(OH)_3 + 3\,e \rightleftharpoons La + 3\,OH^-$	–2.90
$Ba^{2+} + 2\,e \rightleftharpoons Ba$	–2.912
$K^+ + e \rightleftharpoons K$	–2.931
$Rb^+ + e \rightleftharpoons Rb$	–2.98
$Ba(OH)_2 + 2\,e \rightleftharpoons Ba + 2\,OH^-$	–2.99
$Er^{3+} + e \rightleftharpoons Er^{2+}$	–3.0
$Ca(OH)_2 + 2\,e \rightleftharpoons Ca + 2\,OH^-$	–3.02
$Cs^+ + e \rightleftharpoons Cs$	–3.026
$Li^+ + e \rightleftharpoons Li$	–3.0401
$3\,N_2 + 2\,H^+ + 2\,e \rightleftharpoons 2\,HN_3$	–3.09
$Pr^{3+} + e \rightleftharpoons Pr^{2+}$	–3.1
$Ca^+ + e \rightleftharpoons Ca$	–3.80
$Sr^+ + e \rightleftharpoons Sr$	–4.10

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